

DEPARTMENT OF COMMERCE

CIRCULAR
OF THE
BUREAU OF STANDARDS

S. W. STRATTON, DIRECTOR

No. 19

STANDARD DENSITY AND VOLUMETRIC TABLES

[5th Edition]

Issued March 30, 1916



WASHINGTON
GOVERNMENT PRINTING OFFICE

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INTRODUCTION

The wide application of hydrometers as measuring instruments in the collection of revenues in commerce and in the industries makes it very important to define the various scales of indication of these instruments in terms of fundamental units.

The confusion and discordance heretofore resulting from the use of various insufficiently defined hydrometer scales, and the lack of opportunity for verifying standards on a uniform basis, led the Bureau to investigate the problems connected with hydrometry and to prepare standard density tables for definition of hydrometer scales.

In Bureau Circular No. 16 the conditions are announced under which the testing of hydrometers will be conducted, and specifications are given as to the construction, standardization, and accuracy required for hydrometers in order that they be approved as precision instruments.

The present circular comprises the density tables which have been adopted for definition of hydrometer scales, auxiliary tables which have been prepared for reduction of hydrometer readings, tables for computation of volumetric capacity, and others of similar nature giving physical constants for which the Bureau receives frequent inquiries.

In all tables found in this circular the term DENSITY is used to represent the MASS per UNIT VOLUME and is expressed in GRAMS per MILLILITER.

The term SPECIFIC GRAVITY is used to express the RELATIVE MASSES of EQUAL VOLUMES of the liquid in question and of water, EACH LIQUID being at a DEFINITELY STATED TEMPERATURE. For example, specific gravity at $\frac{60^{\circ}}{60}$ F means the specific gravity of the liquid at 60° F referred to water at 60° F as unity.

The density values in Tables 1, 2, 8, 12, 13, 26, and 27 are numerically the same as specific gravities at the various temperatures referred to water at 4° C as unity.

For the sake of uniformity the same abbreviation, D, with the proper temperature basis, is used for both density and specific gravity.

S. W. STRATTON,
Director.

Approved:
WILLIAM C. REDFIELD,
Secretary.

TABLE 1.—Density² (in grams per milliliter) of Mixtures of Ethyl Alcohol and Water^{2a}

Per cent alcohol by weight	Temperature						
	10° C	15° C	20° C	25° C	30° C	35° C	40° C
0	0.99973	0.99913	0.99823	0.99708	0.99568	0.99406	0.99225
1	785	725	636	520	379	217	034
2	602	542	453	336	194	031	.98846
3	426	365	275	157	014	.98849	663
4	258	195	103	.98984	.98839	672	485
5	098	032	.98938	817	670	501	311
6	.98946	.98877	780	656	507	335	142
7	801	729	627	500	347	172	.97975
8	660	584	478	346	189	009	808
9	524	442	331	193	031	.97846	641
10	393	304	187	043	.97875	685	475
11	267	171	047	.97897	723	527	312
12	145	041	.97910	753	573	371	150
13	026	.97914	775	611	424	216	.96989
14	.97911	790	643	472	278	063	829
15	800	669	514	334	133	.96911	670
16	692	552	387	199	.96990	760	512
17	583	433	259	062	844	607	352
18	473	313	129	.96923	697	452	189
19	363	191	.96997	782	547	294	023
20	252	068	864	639	395	134	.95856
21	139	.96944	729	495	242	.95973	687
22	024	818	592	348	087	809	516
23	.96907	689	453	199	.95929	643	343
24	787	558	312	048	769	476	168
25	665	424	168	.95895	607	306	.94991
26	539	287	020	738	442	133	810
27	406	144	.95867	576	272	.94955	625
28	268	.95996	710	410	098	774	438
29	125	844	548	241	.94922	590	248
30	.95977	686	382	067	741	403	055
31	823	524	212	.94890	557	214	.93860
32	665	357	038	709	370	021	662
33	502	186	.94860	525	180	.93825	461
34	334	011	679	337	.93986	626	257
35	162	.94832	494	146	790	425	051
36	.94986	650	306	.93952	591	221	.92843
37	805	464	114	756	390	016	634
38	620	273	.93919	556	186	.92808	422
39	431	079	720	353	.92979	597	208
40	238	.93882	518	148	770	385	.91992
41	042	682	314	.92940	558	170	774
42	.93842	478	107	729	344	.91952	554
43	639	271	.92897	516	128	733	332
44	433	062	685	301	.91910	513	108
45	226	.92852	472	085	692	291	.90884
46	017	640	257	.91868	472	069	660
47	.92806	426	041	649	250	.90845	434
48	593	211	.91823	429	028	621	207
49	379	.91995	604	208	.90805	396	.89979
50	162	776	384	.90985	580	168	750

² The density values given in this table are numerically the same as specific gravities at the various temperatures in terms of water at 4° C of unity.

^{2a} Tables 1, 2, 3, 4, 5, 6, and 7 of this circular are based on the work done at this Bureau and published in the Bulletin of the Bureau of Standards, vol. 9, No. 3. (Reprint No. 197.)

TABLE 1.—Density (in grams per milliliter) of Mixtures of Ethyl Alcohol and Water—Continued

Per cent alcohol by weight	Temperature						
	10° C	15° C	20° C	25° C	30° C	35° C	40° C
50	0.92162	0.91776	0.91384	0.90985	0.90580	0.90168	0.89750
51	.91943	.555	.160	.760	.353	.89940	.519
52	.723	.333	.90936	.534	.125	.710	.288
53	.502	.110	.711	.307	.89896	.479	.056
54	.279	.90885	.485	.079	.667	.248	.88823
55	.055	.659	.258	.89850	.437	.016	.589
56	.90831	.433	.031	.621	.206	.88784	.356
57	.607	.207	.89803	.392	.88975	.552	.122
58	.381	.89980	.574	.162	.744	.319	.87888
59	.154	.752	.344	.88931	.512	.085	.653
60	.89927	.523	.113	.699	.278	.87851	.417
61	.698	.293	.88882	.466	.044	.615	.180
62	.468	.062	.650	.233	.87809	.379	.86943
63	.237	.88830	.417	.87998	.574	.142	.705
64	.006	.597	.183	.763	.337	.86905	.466
65	.88774	.364	.87948	.527	.100	.667	.227
66	.541	.130	.713	.291	.86863	.429	.85987
67	.308	.87895	.477	.054	.625	.190	.747
68	.074	.660	.241	.86817	.387	.85950	.507
69	.87839	.424	.004	.579	.148	.710	.266
70	.602	.187	.86766	.340	.85908	.470	.025
71	.365	.86949	.527	.100	.667	.228	.84783
72	.127	.710	.287	.85859	.426	.84986	.540
73	.86888	.470	.047	.618	.184	.743	.297
74	.648	.229	.85806	.376	.84941	.500	.053
75	.408	.85988	.564	.134	.698	.257	.83809
76	.168	.747	.322	.84891	.455	.013	.564
77	.85927	.505	.079	.647	.211	.83768	.319
78	.685	.262	.84835	.403	.83966	.523	.074
79	.442	.018	.590	.158	.720	.277	.82827
80	.197	.84772	.344	.83911	.473	.029	.578
81	.84950	.525	.096	.664	.224	.82780	.329
82	.702	.277	.83848	.415	.82974	.530	.079
83	.453	.028	.599	.164	.724	.279	.81828
84	.203	.83777	.348	.82913	.473	.027	.576
85	.83951	.525	.095	.660	.220	.81774	.322
86	.697	.271	.82840	.405	.81965	.519	.067
87	.441	.014	.583	.148	.708	.262	.80811
88	.181	.82754	.323	.81888	.448	.003	.552
89	.82919	.492	.062	.626	.186	.80742	.291
90	.654	.227	.81797	.362	.80922	.478	.028
91	.386	.81959	.529	.094	.655	.211	.79761
92	.114	.698	.257	.80823	.384	.79941	.491
93	.81839	.413	.80983	.549	.111	.669	.220
94	.561	.134	.705	.272	.79835	.393	.78947
95	.278	.80352	.424	.79991	.555	.114	.670
96	.80991	.566	.138	.706	.271	.78831	.388
97	.698	.274	.79846	.415	.78981	.542	.100
98	.399	.79975	.547	.117	.684	.247	.77806
99	.094	.670	.243	.78814	.382	.77946	.507
100	.79784	.360	.79394	.506	.075	.641	.203

TABLE 2.—Density ^{2b} (in grams per milliliter) of Mixtures of Ethyl Alcohol and Water at 20° C

Per Cent Alcohol by Weight	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
0	0.99823	804	785	766	748	729	710	692	673	655
1	636	618	599	581	562	544	525	507	489	471
2	453	435	417	399	381	363	345	327	310	292
3	275	257	240	222	205	188	171	154	137	120
4	103	087	070	053	037	020	003	*987	*971	*954
5	.98938	922	906	890	874	859	843	827	811	796
6	780	765	749	734	718	703	688	673	658	642
7	627	612	597	582	567	553	538	523	508	493
8	478	463	449	434	419	404	389	374	360	345
9	331	316	301	287	273	258	244	229	215	201
10	187	172	158	144	130	117	103	089	075	061
11	047	033	019	006	*992	*978	*964	*951	*937	*923
12	.97910	896	883	869	855	842	828	815	801	788
13	775	761	748	735	722	709	696	683	670	657
14	643	630	617	604	591	578	565	552	539	526
15	514	501	488	475	462	450	438	425	412	400
16	387	374	361	349	336	323	310	297	284	272
17	259	246	233	220	207	194	181	168	155	142
18	129	116	103	089	076	063	050	037	024	010
19	.96997	984	971	957	944	931	917	904	891	877
20	864	850	837	823	810	796	783	769	756	742
21	729	716	702	688	675	661	647	634	620	606
22	592	578	564	551	537	523	509	495	481	467
23	453	439	425	411	396	382	368	354	340	326
24	312	297	283	269	254	240	225	211	196	182
25	168	153	139	124	109	094	080	065	050	035
26	020	005	*990	*975	*959	*944	*929	*914	*898	*883
27	.95867	851	836	820	805	789	773	757	742	726
28	710	694	678	662	646	630	613	597	581	565
29	548	532	516	499	483	466	450	433	416	400
30	382	365	349	332	315	298	281	264	247	230
31	212	195	178	161	143	126	108	091	074	056
32	038	020	003	*985	*967	*950	*932	*914	*896	*878
33	.94860	842	824	806	788	770	752	734	715	697
34	679	660	642	624	605	587	568	550	531	512
35	494	475	456	438	419	400	382	363	344	325
36	306	287	268	249	230	211	192	172	153	134
37	114	095	075	056	036	017	*997	*978	*958	*939
38	.93919	899	879	859	840	820	800	780	760	740
39	720	700	680	660	640	620	599	579	559	539
40	518	498	478	458	437	417	396	376	356	335
41	314	294	273	253	232	212	191	170	149	129
42	107	086	065	044	023	002	*981	*960	*939	*918
43	.92897	876	855	834	812	791	770	749	728	707
44	685	664	642	621	600	579	557	536	515	493
45	472	450	429	408	386	365	343	322	300	279
46	257	236	214	193	171	150	128	106	085	063
47	041	019	*997	*976	*954	*932	*910	*889	*867	*845
48	.91823	801	780	758	736	714	692	670	648	626
49	604	582	560	538	516	494	472	450	428	406
50	384	361	339	317	295	272	250	228	206	183

^{2b} The density values given in this table are numerically the same as specific gravity at 20° C in terms of water at 4° C as unity.

TABLE 2.—Density (in grams per milliliter) of Mixtures of Ethyl Alcohol and Water, at 20° C—Continued

Per Cent Alcohol by Weight	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
50	0.91384	361	339	317	295	272	250	228	206	183
51	160	138	116	093	071	049	026	004	*981	*959
52	.90936	914	891	869	846	824	801	779	756	734
53	711	689	666	644	621	598	576	553	531	508
54	485	463	440	417	395	372	349	327	304	281
55	258	236	213	190	167	145	122	099	076	054
56	031	008	*985	*962	*939	*917	*894	*871	*848	*825
57	.89803	780	757	734	711	688	665	643	620	597
58	574	551	528	505	482	459	436	413	390	367
59	344	321	298	275	252	229	206	183	160	137
60	113	090	067	044	021	*998	*975	*951	*928	*905
61	.88882	859	836	812	789	766	743	720	696	673
62	650	626	603	580	557	533	510	487	463	440
63	417	393	370	347	323	300	277	253	230	206
64	183	160	136	113	089	066	042	019	*995	*972
65	.87948	925	901	878	854	831	807	784	760	737
66	713	689	666	642	619	595	572	548	524	501
67	477	454	430	406	383	359	336	312	288	265
68	241	218	194	170	147	123	099	075	052	028
69	004	*981	*957	*933	*909	*885	*862	*838	*814	*790
70	.86766	742	718	694	671	647	623	599	575	551
71	527	503	479	455	431	407	383	359	335	311
72	287	263	239	215	191	167	143	119	095	071
73	047	022	*998	*974	*950	*926	*902	*878	*854	*830
74	.85806	781	757	733	709	685	661	636	612	588
75	564	540	515	491	467	443	419	394	370	346
76	322	297	273	249	225	200	176	152	128	103
77	079	055	031	006	*982	*958	*933	*909	*884	*860
78	.84835	811	787	762	738	713	689	664	640	615
79	590	566	541	517	492	467	443	418	393	369
80	344	319	294	270	245	220	196	171	146	121
81	096	072	047	022	*997	*972	*947	*923	*898	*873
82	.83848	823	798	773	748	723	698	674	649	624
83	599	574	549	523	498	473	448	423	398	373
84	348	323	297	272	247	222	196	171	146	120
85	095	070	044	019	*994	*968	*943	*917	*892	*866
86	.82840	815	789	763	738	712	686	660	635	609
87	583	557	531	505	479	453	427	401	375	349
88	323	297	271	245	219	193	167	140	114	088
89	062	035	009	*983	*956	*930	*903	*877	*850	*824
90	.81797	770	744	717	690	664	637	610	583	556
91	529	502	475	448	421	394	366	339	312	285
92	257	230	203	175	148	120	093	066	038	010</

TABLE 3.—Specific Gravity at $\frac{60^\circ}{60^\circ}$ F ($\frac{15.556}{15.556}$ C) of Mixtures (by Volume) of Ethyl Alcohol and Water

Per Cent Alcohol by Volume at 60° F	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
0	1.00000	*985	*970	*955	*940	*925	*910	*895	*880	*865
1	.99850	835	820	806	791	776	761	747	732	717
2	703	688	674	659	645	630	616	602	587	573
3	559	545	531	516	502	488	474	460	446	432
4	419	405	391	378	364	350	336	323	309	296
5	282	269	255	242	228	215	202	189	176	163
6	150	137	124	111	098	085	073	060	047	035
7	022	009	*997	*984	*972	*960	*947	*935	*923	*911
8	.98899	887	875	863	851	838	826	814	803	791
9	779	767	755	743	731	720	708	696	684	672
10	661	649	637	625	614	602	590	579	567	556
11	544	532	521	509	498	487	475	464	452	441
12	430	419	408	396	385	374	363	352	341	330
13	319	308	297	286	275	264	254	243	232	221
14	210	200	190	179	168	157	147	136	125	115
15	104	093	083	072	062	051	040	030	019	009
16	.97998	988	977	967	956	946	936	925	915	905
17	895	885	875	864	854	844	834	824	814	804
18	794	784	774	764	754	744	734	724	714	704
19	694	684	674	664	654	645	635	625	615	605
20	596	586	576	566	556	546	536	526	516	506
21	496	486	476	466	456	446	436	425	415	405
22	395	385	375	365	354	344	334	324	313	303
23	293	283	272	262	252	241	231	221	210	200
24	189	179	168	158	147	137	126	116	105	095
25	084	073	063	052	042	031	020	010	*999	*988
26	.96978	967	957	946	935	924	914	903	892	881
27	870	859	848	837	826	815	804	793	782	771
28	760	749	738	727	715	704	693	682	671	659
29	648	637	625	614	603	591	580	568	557	546
30	534	522	511	499	488	476	464	453	441	429
31	418	406	394	382	370	358	346	334	321	309
32	296	284	271	259	246	234	221	209	196	183
33	170	157	144	132	119	106	093	080	067	054
34	041	028	015	002	*988	*975	*962	*948	*935	*921
35	.95908	894	881	867	854	840	826	812	798	784
36	770	756	742	728	714	700	685	671	657	643
37	628	614	599	585	570	556	541	526	512	497
38	482	467	452	437	423	408	393	378	362	347
39	332	317	302	286	271	256	240	225	209	194
40	178	162	147	131	115	100	084	068	052	036
41	020	004	*988	*972	*956	*940	*923	*907	*891	*875
42	.94858	842	825	809	792	776	759	743	726	710
43	693	676	660	643	626	609	592	575	558	541
44	524	507	490	473	455	438	421	403	386	369
45	351	334	316	298	281	263	245	228	210	192
46	174	156	138	120	102	084	066	048	030	011
47	.93993	975	956	938	920	901	883	864	845	827
48	808	789	771	752	733	714	695	676	657	638
49	619	600	581	562	543	523	504	485	465	446
50	426	407	387	368	348	328	309	289	270	250

TABLE 3.—Specific Gravity at $\frac{60}{60}$ ° F ($\frac{159.56}{159.56}$ ° C) of Mixtures (by Volume) of Ethyl Alcohol and Water—Continued

Per Cent Alcohol by Volume at 60° F	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
50	.93426	407	387	368	348	328	309	289	270	250
51	230	210	190	171	151	131	111	091	071	051
52	031	011	*991	*971	*951	*931	*911	*890	*870	*850
53	.92830	810	789	769	749	728	708	688	667	647
54	626	605	585	564	544	523	502	482	461	440
55	419	398	377	357	336	315	294	273	252	231
56	210	189	168	147	126	105	084	062	041	020
57	.91999	978	956	935	914	892	871	849	827	806
58	784	762	741	719	697	675	653	631	610	588
59	565	543	521	499	477	455	433	410	388	366
60	344	322	299	277	255	232	210	188	165	143
61	120	097	075	052	030	007	*984	*962	*939	*916
62	.90893	870	847	825	802	779	756	733	710	687
63	664	641	618	595	572	549	526	503	480	457
64	434	411	388	365	341	318	295	272	249	225
65	202	179	155	132	108	085	061	038	014	*991
66	.89967	943	920	896	872	848	825	801	777	753
67	729	705	681	657	633	609	585	561	537	513
68	489	465	441	416	392	368	343	319	295	270
69	245	220	196	171	147	122	098	073	048	024
70	.88999	974	950	925	900	875	850	825	801	776
71	751	725	700	675	650	625	600	574	549	524
72	499	474	448	423	397	372	346	321	296	270
73	244	218	193	167	141	116	090	064	039	013
74	.87987	961	935	910	884	858	832	806	780	754
75	728	702	676	650	623	597	571	545	518	492
76	465	439	412	386	359	332	306	279	252	226
77	199	172	145	118	092	065	038	011	*984	*957
78	.86929	902	875	847	820	793	766	738	711	684
79	656	629	601	574	546	518	491	463	435	408
80	380	352	324	296	269	241	213	185	157	129
81	100	072	044	015	*987	*959	*931	*902	*874	*846
82	.85817	789	760	732	703	674	646	617	588	560
83	531	502	473	444	415	386	357	328	299	270
84	240	211	181	152	122	093	063	033	004	*974
85	.84944	914	884	854	824	794	764	734	703	673
86	642	612	581	551	520	490	459	428	398	367
87	336	305	274	243	212	181	150	119	088	056
88	025	*994	*962	*930	*899	*867	*835	*803	*771	*739
89	.83707	675	643	610	578	545	513	480	447	415
90	382	349	315	282	249	216	183	150	116	083
91	049	015	*981	*947	*913	*879	*845	*810	*776	*741
92	.82705	670	635	600	565	529	494	458	423	387
93	351	315	279	243	206	170	133	096	059	022
94	.81984	947	909	871	834	796	757	719	681	642
95	603	564	525	486	446	407	367	327	287	247
96	206	165	125	084	042	001	*960	*918	*876	*834
97	.80792	750	707	664	620	577	533	489	445	401
98	356	311	265	219	173	127	080	033	*985	*937
99	.79889	841	792	743	693	643	593	543	492	441
100	389									

TABLE 4.—Temperature Corrections to Readings of Alcoholometers (Standard at 60° F)

[This table is calculated from the same data on the thermal expansion of ethyl alcohol as that from which Tables 1, 2, 3, 5, 6, and 7 are calculated. The hydrometer is assumed to be of Jena 16^{III} glass. For the per cents not given between 40 and 80, linear interpolation of the tabulated corrections will give results sufficiently exact for most purposes.]

Observed Temperature in Degrees Fahrenheit	Observed Per Cent Alcohol by Volume												
	0	1	2	3	4	5	6	7	8	9	10	11	12
	Add to Observed Per Cent Alcohol												
50	0.37	0.38	0.39	0.40	0.42	0.45	0.48	0.52	0.56	0.61	0.66	0.74	0.81
51	.34	.35	.36	.37	.39	.41	.44	.47	.51	.56	.61	.68	.75
52	.32	.32	.33	.34	.35	.38	.40	.43	.47	.51	.55	.62	.68
53	.29	.30	.30	.31	.32	.34	.36	.39	.42	.46	.49	.55	.60
54	.26	.26	.26	.27	.28	.29	.32	.34	.36	.40	.43	.48	.52
55	.22	.22	.23	.23	.24	.25	.27	.29	.31	.34	.37	.40	.44
56	.18	.18	.18	.18	.19	.20	.22	.24	.25	.28	.30	.33	.36
57	.14	.14	.14	.14	.14	.15	.17	.18	.19	.21	.23	.25	.27
58	.09	.10	.10	.10	.10	.10	.11	.12	.13	.14	.16	.16	.18
59	.05	.05	.05	.05	.05	.05	.06	.06	.06	.07	.08	.08	.09
Subtract from Observed Per Cent Alcohol													
61		0.05	0.05	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08	0.09	0.10
62		.10	.11	.12	.12	.13	.14	.14	.16	.16	.17	.18	.20
63		.16	.17	.18	.19	.20	.20	.21	.23	.24	.25	.27	.29
64		.22	.23	.24	.25	.26	.27	.29	.31	.32	.34	.37	.39
65		.28	.29	.30	.32	.33	.34	.36	.39	.41	.43	.46	.49
66		.34	.35	.36	.38	.40	.42	.44	.47	.50	.52	.56	.59
67		.41	.42	.43	.45	.47	.50	.52	.55	.58	.61	.65	.70
68		.48	.48	.50	.52	.54	.57	.60	.64	.67	.71	.75	.80
69		.55	.56	.57	.59	.62	.66	.68	.73	.76	.80	.85	.91
70		.62	.63	.64	.67	.70	.74	.77	.81	.86	.90	.96	1.02
72		.77	.78	.80	.83	.86	.90	.94	.99	1.04	1.10	1.16	1.23
74		.93	.94	.96	1.00	1.03	1.09	1.13	1.18	1.25	1.32	1.39	1.46
76			1.10	1.13	1.17	1.21	1.27	1.32	1.38	1.46	1.54	1.61	1.70
78			1.28	1.31	1.35	1.40	1.46	1.52	1.59	1.67	1.76	1.84	1.94
80			1.46	1.50	1.54	1.60	1.66	1.73	1.80	1.89	1.99	2.09	2.20
82			1.64	1.69	1.74	1.80	1.87	1.94	2.02	2.12	2.22	2.34	2.45
84			1.84	1.89	1.94	2.00	2.08	2.16	2.25	2.35	2.47	2.59	2.71
86				2.09	2.15	2.22	2.30	2.39	2.49	2.60	2.72	2.84	2.97
88				2.30	2.37	2.44	2.53	2.62	2.73	2.85	2.98	3.10	3.23
90				2.52	2.59	2.66	2.76	2.86	2.98	3.11	3.24	3.36	3.50
92				2.74	2.82	2.89	3.00	3.11	3.24	3.37	3.51	3.64	3.78
94				2.97	3.04	3.12	3.24	3.36	3.50	3.63	3.78	3.92	4.07
96					3.28	3.36	3.49	3.62	3.76	3.90	4.05	4.20	4.36
98					3.52	3.60	3.74	3.88	4.03	4.17	4.32	4.50	4.66
100					3.76	3.85	4.00	4.15	4.30	4.45	4.60	4.78	4.95

TABLE 4.—Temperature Corrections to Readings of Alcoholometers (Standard at 60° F)—Continued

Observed Temperature in Degrees Fahrenheit	Observed Per Cent Alcohol by Volume											
	13	14	15	16	17	18	19	20	21	22	23	24
	Add to Observed Per Cent Alcohol											
50	0.90	0.99	1.09	1.19	1.30	1.41	1.52	1.62	1.72	1.82	1.90	1.98
51	.82	.90	.99	1.08	1.18	1.28	1.38	1.47	1.56	1.64	1.71	1.79
52	.74	.80	.89	.96	1.06	1.14	1.23	1.31	1.38	1.46	1.52	1.58
53	.65	.71	.78	.85	.94	1.00	1.08	1.15	1.21	1.28	1.34	1.39
54	.57	.62	.68	.74	.81	.86	.94	.99	1.04	1.10	1.15	1.20
55	.48	.52	.57	.62	.68	.72	.78	.83	.87	.92	.96	1.00
56	.38	.42	.46	.49	.54	.58	.63	.67	.69	.74	.77	.80
57	.29	.32	.35	.37	.40	.44	.47	.51	.53	.56	.58	.60
58	.19	.21	.23	.24	.26	.29	.32	.34	.35	.38	.40	.40
59	.10	.11	.12	.12	.13	.14	.16	.17	.18	.19	.20	.20
	Subtract from Observed Per Cent Alcohol											
	13	14	15	16	17	18	19	20	21	22	23	24
61	0.10	0.11	0.12	0.13	0.14	0.14	0.15	0.16	0.17	0.17	0.18	0.18
62	.21	.22	.24	.26	.27	.29	.30	.32	.34	.36	.37	.38
63	.31	.32	.35	.38	.41	.44	.46	.49	.51	.53	.55	.56
64	.42	.44	.48	.52	.54	.58	.62	.66	.68	.71	.74	.77
65	.52	.55	.60	.65	.68	.73	.78	.82	.85	.90	.92	.96
66	.63	.66	.71	.77	.82	.88	.94	.98	1.02	1.07	1.11	1.16
67	.74	.78	.84	.90	.96	1.03	1.10	1.15	1.20	1.25	1.30	1.35
68	.85	.91	.97	1.03	1.10	1.18	1.26	1.33	1.38	1.44	1.49	1.54
69	.97	1.02	1.10	1.17	1.25	1.33	1.42	1.48	1.54	1.61	1.66	1.72
70	1.08	1.14	1.23	1.31	1.40	1.49	1.58	1.65	1.72	1.78	1.84	1.91
72	1.31	1.39	1.50	1.60	1.70	1.80	1.90	2.00	2.06	2.13	2.20	2.27
74	1.55	1.65	1.76	1.88	1.99	2.10	2.22	2.32	2.41	2.48	2.56	2.65
76	1.80	1.91	2.03	2.16	2.28	2.41	2.54	2.65	2.76	2.84	2.93	3.03
78	2.05	2.17	2.30	2.44	2.58	2.72	2.86	2.98	3.10	3.20	3.30	3.40
80	2.31	2.44	2.58	2.72	2.87	3.02	3.17	3.33	3.45	3.56	3.67	3.78
82	2.57	2.71	2.86	3.00	3.16	3.33	3.50	3.66	3.79	3.92	4.04	4.18
84	2.84	2.98	3.13	3.29	3.46	3.63	3.81	4.00	4.14	4.28	4.42	4.56
86	3.11	3.26	3.41	3.58	3.76	3.94	4.13	4.33	4.49	4.65	4.80	4.94
88	3.38	3.54	3.70	3.88	4.07	4.26	4.46	4.67	4.84	5.00	5.17	5.32
90	3.66	3.83	4.00	4.18	4.38	4.58	4.78	5.01	5.19	5.36	5.53	5.69
92	3.94	4.11	4.29	4.48	4.69	4.90	5.12	5.35	5.54	5.72	5.90	6.07
94	4.23	4.40	4.58	4.79	5.00	5.22	5.46	5.69	5.89	6.08	6.28	6.45
96	4.53	4.69	4.87	5.10	5.32	5.55	5.80	6.03	6.24	6.44	6.64	6.82
98	4.83	5.00	5.18	5.41	5.64	5.88	6.13	6.38	6.60	6.80	7.02	7.20
100	5.13	5.30	5.49	5.72	5.95	6.21	6.46	6.72	6.95	7.17	7.40	7.59

TABLE 4.—Temperature Corrections to Readings of Alcoholometers (Standard at 60° F)—Continued

Observed Temperature in Degrees Fahrenheit	Observed Per Cent Alcohol by Volume										
	36	37	38	39	40	45	50	55	60	65	70
	Add to Observed Per Cent Alcohol										
50	2.28	2.27	2.26	2.25	2.24	2.14	2.04	1.98	1.90	1.85	1.78
51	2.06	2.04	2.03	2.03	2.02	1.91	1.84	1.78	1.71	1.66	1.60
52	1.82	1.80	1.80	1.80	1.79	1.71	1.64	1.58	1.52	1.47	1.42
53	1.60	1.58	1.58	1.58	1.56	1.50	1.44	1.38	1.33	1.29	1.25
54	1.37	1.36	1.36	1.36	1.34	1.28	1.23	1.19	1.14	1.11	1.08
55	1.14	1.13	1.13	1.13	1.11	1.06	1.02	.99	.95	.92	.90
56	.91	.90	.90	.90	.89	.85	.81	.79	.76	.74	.72
57	.68	.67	.68	.68	.67	.64	.61	.59	.57	.55	.54
58	.46	.46	.46	.46	.45	.42	.40	.39	.39	.38	.36
59	.23	.23	.23	.23	.23	.21	.20	.20	.19	.18	.18
	Subtract from Observed Per Cent Alcohol										
	61	62	63	64	65	66	67	68	69	70	72
	0.23	0.23	0.23	0.23	0.23	0.22	0.21	0.20	0.20	0.18	0.18
61	.46	.46	.46	.45	.45	.44	.42	.40	.39	.38	.36
62	.68	.68	.68	.68	.68	.66	.62	.60	.58	.56	.54
63	.92	.92	.91	.90	.90	.87	.84	.81	.78	.75	.72
64	1.14	1.14	1.13	1.12	1.12	1.09	1.05	1.01	.97	.94	.90
65	1.37	1.36	1.36	1.35	1.34	1.30	1.25	1.21	1.17	1.13	1.09
66	1.60	1.60	1.60	1.58	1.56	1.52	1.46	1.41	1.37	1.32	1.27
67	1.82	1.82	1.81	1.80	1.79	1.74	1.66	1.61	1.55	1.50	1.45
68	2.04	2.03	2.03	2.03	2.01	1.96	1.88	1.81	1.75	1.69	1.63
69	2.27	2.27	2.26	2.25	2.24	2.17	2.09	2.02	1.95	1.88	1.82
70	2.72	2.72	2.72	2.70	2.68	2.61	2.51	2.42	2.34	2.26	2.18
72	3.18	3.17	3.17	3.16	3.14	3.04	2.93	2.83	2.73	2.65	2.56
74	3.63	3.62	3.62	3.60	3.58	3.47	3.35	3.24	3.13	3.03	2.93
76	4.09	4.08	4.07	4.06	4.02	3.92	3.78	3.64	3.53	3.42	3.30
78	4.54	4.53	4.52	4.50	4.48	4.36	4.20	4.05	3.93	3.80	3.68
80	5.00	4.98	4.98	4.96	4.94	4.81	4.63	4.47	4.33	4.19	4.06
82	5.45	5.44	5.43	5.40	5.38	5.25	5.06	4.88	4.73	4.58	4.44
84	5.90	5.89	5.88	5.86	5.84	5.70	5.49	5.30	5.14	4.98	4.82
86	6.35	6.34	6.33	6.31	6.29	6.14	5.92	5.72	5.54	5.37	5.20
88	6.80	6.80	6.78	6.76	6.73	6.58	6.36	6.14	5.95	5.76	5.59
90	7.25	7.25	7.22	7.20	7.18	7.03	6.80	6.56	6.36	6.16	5.98
92	7.70	7.70	7.67	7.66	7.63	7.48	7.24	6.98	6.77	6.56	6.37
94	8.14	8.15	8.12	8.11	8.08	7.92	7.68	7.40	7.19	6.96	6.76
96	8.58	8.60	8.58	8.56	8.54	8.36	8.11	7.82	7.60	7.36	7.15
98	9.03	9.04	9.03	9.01	8.98	8.81	8.45	8.25	8.02	7.76	7.54
100											

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TABLE 4.—Temperature Corrections to Readings of Alcoholometers (Standard at 60° F)—Continued

Observed Temperature in Degrees Fahrenheit	Observed Per Cent Alcohol by Volume										
	75	80	81	82	83	84	85	86	87	88	89
	Add to Observed Per Cent Alcohol										
50	1.71	1.63	1.62	1.60	1.58	1.56	1.53	1.51	1.48	1.46	1.43
51	1.54	1.47	1.46	1.44	1.42	1.40	1.38	1.36	1.33	1.31	1.28
52	1.36	1.30	1.30	1.28	1.26	1.24	1.22	1.20	1.18	1.16	1.14
53	1.20	1.15	1.14	1.12	1.11	1.09	1.07	1.06	1.04	1.02	1.00
54	1.04	.98	.98	.96	.95	.94	.92	.91	.89	.88	.86
55	.87	.82	.81	.80	.79	.78	.76	.75	.74	.74	.72
56	.70	.66	.65	.64	.63	.62	.61	.60	.59	.58	.57
57	.53	.49	.49	.49	.48	.47	.46	.46	.45	.44	.43
58	.34	.32	.32	.32	.31	.30	.30	.30	.30	.29	.28
59	.17	.16	.16	.16	.16	.15	.15	.15	.15	.15	.14
Subtract from Observed Per Cent Alcohol											
61	0.17	0.17	0.17	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.15
62	.34	.34	.34	.32	.32	.32	.32	.31	.31	.31	.30
63	.52	.50	.50	.48	.48	.48	.48	.47	.46	.46	.44
64	.70	.68	.66	.65	.65	.64	.63	.62	.61	.60	.59
65	.86	.84	.82	.82	.81	.80	.79	.78	.77	.76	.74
66	1.05	1.00	.99	.98	.97	.96	.94	.93	.92	.90	.88
67	1.22	1.17	1.16	1.14	1.13	1.12	1.10	1.09	1.08	1.06	1.02
68	1.40	1.33	1.32	1.31	1.29	1.28	1.26	1.24	1.22	1.20	1.17
69	1.57	1.50	1.49	1.47	1.46	1.44	1.42	1.40	1.38	1.36	1.32
70	1.75	1.68	1.66	1.64	1.62	1.60	1.58	1.56	1.54	1.51	1.48
72	2.10	2.02	2.00	1.97	1.95	1.93	1.90	1.88	1.85	1.82	1.78
74	2.46	2.36	2.34	2.30	2.28	2.26	2.24	2.20	2.17	2.13	2.09
76	2.81	2.70	2.68	2.64	2.61	2.59	2.56	2.52	2.48	2.44	2.40
78	3.18	3.04	3.02	2.98	2.94	2.92	2.88	2.84	2.80	2.76	2.71
80	3.54	3.38	3.36	3.32	3.28	3.26	3.22	3.17	3.13	3.08	3.02
82	3.90	3.72	3.71	3.66	3.62	3.59	3.54	3.50	3.45	3.40	3.33
84	4.27	4.08	4.05	4.00	3.96	3.92	3.88	3.83	3.77	3.72	3.65
86	4.64	4.43	4.39	4.35	4.30	4.26	4.21	4.16	4.10	4.04	3.96
88	5.00	4.78	4.75	4.70	4.65	4.60	4.55	4.50	4.44	4.37	4.29
90	5.37	5.14	5.10	5.06	5.00	4.95	4.88	4.83	4.77	4.70	4.61
92	5.75	5.50	5.46	5.42	5.36	5.30	5.23	5.18	5.10	5.03	4.94
94	6.12	5.86	5.81	5.76	5.70	5.64	5.58	5.51	5.44	5.36	5.26
96	6.50	6.23	6.17	6.12	6.06	5.99	5.92	5.86	5.78	5.69	5.59
98	6.88	6.60	6.50	6.48	6.41	6.34	6.26	6.20	6.11	6.02	5.92
100	7.26	6.96	6.89	6.84	6.76	6.70	6.61	6.54	6.44	6.36	6.26

TABLE 4.—Temperature Corrections to Readings of Alcoholometers (Standard at 60° F)—Continued

Observed Temperature in Degrees Fahrenheit	Observed Per Cent Alcohol by Volume										
	90	91	92	93	94	95	96	97	98	99	100
	Add to Observed Per Cent Alcohol										
50	1.39	1.36	1.32	1.27	1.22	1.17	1.12	1.06	0.99	0.93	.....
51	1.25	1.22	1.18	1.14	1.10	1.06	1.01	.95	.89	.84	.....
52	1.12	1.09	1.06	1.02	.98	.94	.90	.85	.79	.74	.....
53	.98	.96	.93	.90	.86	.83	.79	.74	.70	.65	.....
54	.84	.82	.80	.77	.74	.72	.68	.64	.60	.56	.....
55	.70	.69	.66	.64	.62	.60	.57	.53	.50	.47	.....
56	.56	.55	.53	.52	.49	.48	.45	.43	.40	.38	.....
57	.42	.41	.40	.39	.37	.36	.34	.32	.30	.29	.....
58	.28	.27	.26	.26	.24	.24	.23	.21	.20	.19	.....
59	.14	.14	.13	.13	.12	.12	.12	.11	.10	.10	.....
	Subtract from Observed Per Cent Alcohol										
61	0.15	0.14	0.14	0.13	0.13	0.12	0.12	0.11	0.10	0.10	0.09
62	.29	.28	.27	.26	.25	.24	.23	.22	.21	.19	.18
63	.43	.42	.41	.39	.38	.36	.35	.33	.31	.29	.27
64	.58	.55	.54	.52	.51	.49	.46	.44	.41	.39	.36
65	.72	.70	.68	.66	.64	.61	.58	.55	.52	.49	.46
66	.86	.84	.82	.79	.76	.73	.70	.67	.63	.59	.55
67	1.00	.98	.96	.93	.90	.86	.82	.78	.74	.70	.64
68	1.15	1.12	1.09	1.06	1.02	.98	.94	.90	.85	.80	.74
69	1.30	1.26	1.23	1.20	1.16	1.10	1.06	1.02	.96	.90	.84
70	1.45	1.41	1.37	1.34	1.29	1.23	1.19	1.14	1.07	1.00	.94
72	1.74	1.70	1.65	1.61	1.55	1.49	1.43	1.37	1.30	1.22	1.13
74	2.05	2.00	1.94	1.89	1.82	1.75	1.69	1.61	1.53	1.43	1.33
76	2.35	2.29	2.23	2.17	2.09	2.01	1.94	1.85	1.76	1.65	1.53
78	2.65	2.59	2.52	2.46	2.36	2.28	2.20	2.10	2.00	1.87	1.73
80	2.96	2.89	2.82	2.74	2.64	2.56	2.46	2.35	2.24	2.09	1.93
82	3.26	3.20	3.12	3.03	2.92	2.84	2.72	2.60	2.48	2.32	2.14
84	3.57	3.50	3.39	3.32	3.21	3.10	2.96	2.86	2.73	2.56	2.36
86	3.89	3.80	3.72	3.62	3.51	3.38	3.26	3.13	2.98	2.80	2.58
88	4.20	4.12	4.02	3.91	3.80	3.66	3.54	3.39	3.24	3.06	2.81
90	4.52	4.42	4.32	4.20	4.08	3.94	3.81	3.66	3.50	3.30	3.03
92	4.84	4.74	4.62	4.50	4.38	4.23	4.10	3.93	3.76	3.55	3.26
94	5.16	5.06	4.94	4.80	4.67	4.52	4.38	4.20	4.02	3.80	3.50
96	5.49	5.39	5.25	5.11	4.97	4.82	4.67	4.48	4.29	4.06	3.73
98	5.82	5.70	5.56	5.42	5.27	5.12	4.95	4.76	4.55	4.31	3.96
100	6.15	6.02	5.88	5.74	5.58	5.42	5.24	5.04	4.82	4.56	4.21

TABLE 5.—Percentages by Volume at 60° F, Corresponding to Various Percentages by Weight in Mixtures of Ethyl Alcohol and Water

Per Cent Alcohol by Weight	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
0	0.000	0.126	0.252	0.378	0.504	0.630	0.755	0.881	1.007	1.132
1	1.257	1.382	1.508	1.633	1.759	1.884	2.009	2.134	2.260	2.385
2	2.510	2.635	2.760	2.885	3.010	3.135	3.259	3.384	3.509	3.633
3	3.758	3.883	4.007	4.132	4.256	4.381	4.505	4.629	4.754	4.878
4	5.002	5.126	5.250	5.374	5.499	5.623	5.747	5.871	5.995	6.119
5	6.243	6.367	6.491	6.614	6.738	6.862	6.985	7.109	7.232	7.356
6	7.479	7.602	7.726	7.849	7.972	8.096	8.219	8.342	8.466	8.589
7	8.712	8.835	8.958	9.081	9.205	9.328	9.451	9.574	9.697	9.820
8	9.943	10.066	10.189	10.311	10.434	10.557	10.679	10.802	10.925	11.047
9	11.169	11.292	11.414	11.536	11.659	11.781	11.904	12.026	12.149	12.271
10	12.393	12.515	12.637	12.760	12.882	13.004	13.126	13.248	13.370	13.492
11	13.613	13.735	13.857	13.979	14.101	14.223	14.345	14.466	14.588	14.710
12	14.832	14.954	15.075	15.197	15.319	15.440	15.562	15.683	15.805	15.926
13	16.047	16.168	16.290	16.411	16.532	16.654	16.775	16.896	17.017	17.138
14	17.259	17.380	17.501	17.622	17.743	17.864	17.985	18.106	18.227	18.348
15	18.469	18.590	18.711	18.832	18.952	19.073	19.194	19.315	19.435	19.556
16	19.676	19.797	19.917	20.038	20.158	20.279	20.399	20.519	20.640	20.760
17	20.880	21.000	21.120	21.241	21.361	21.481	21.601	21.721	21.841	21.961
18	22.081	22.201	22.321	22.441	22.561	22.680	22.800	22.919	23.039	23.159
19	23.278	23.398	23.517	23.636	23.756	23.875	23.995	24.114	24.234	24.353
20	24.472	24.591	24.710	24.829	24.949	25.068	25.187	25.305	25.424	25.543
21	25.662	25.781	25.900	26.018	26.137	26.256	26.375	26.493	26.612	26.730
22	26.849	26.968	27.086	27.204	27.323	27.441	27.559	27.677	27.796	27.914
23	28.032	28.150	28.268	28.386	28.504	28.622	28.740	28.858	28.976	29.093
24	29.210	29.328	29.446	29.563	29.681	29.799	29.917	30.035	30.152	30.270
25	30.388	30.505	30.622	30.739	30.855	30.972	31.089	31.205	31.322	31.438
26	31.555	31.672	31.788	31.905	32.021	32.138	32.254	32.370	32.487	32.603
27	32.719	32.835	32.951	33.068	33.184	33.300	33.416	33.532	33.647	33.763
28	33.879	33.995	34.111	34.227	34.342	34.458	34.573	34.688	34.803	34.918
29	35.033	35.148	35.263	35.378	35.493	35.608	35.723	35.838	35.952	36.066
30	36.181	36.296	36.410	36.524	36.639	36.753	36.867	36.981	37.095	37.209
31	37.323	37.437	37.551	37.664	37.778	37.892	38.005	38.119	38.232	38.346
32	38.459	38.572	38.686	38.799	38.912	39.025	39.138	39.251	39.364	39.477
33	39.590	39.703	39.816	39.928	40.041	40.154	40.266	40.379	40.492	40.604
34	40.716	40.828	40.940	41.052	41.163	41.275	41.386	41.498	41.609	41.721
35	41.832	41.943	42.055	42.166	42.277	42.389	42.500	42.611	42.722	42.833
36	42.944	43.055	43.165	43.276	43.387	43.498	43.608	43.719	43.829	43.939
37	44.050	44.160	44.270	44.381	44.490	44.600	44.710	44.820	44.930	45.039
38	45.149	45.259	45.368	45.478	45.587	45.696	45.806	45.915	46.024	46.133
39	46.242	46.351	46.460	46.569	46.678	46.786	46.895	47.003	47.112	47.220
40	47.328	47.436	47.544	47.652	47.760	47.868	47.976	48.084	48.192	48.299
41	48.407	48.515	48.622	48.730	48.837	48.945	49.052	49.159	49.266	49.373
42	49.480	49.587	49.694	49.801	49.907	50.014	50.120	50.226	50.333	50.439
43	50.545	50.651	50.757	50.864	50.970	51.076	51.182	51.288	51.394	51.499
44	51.605	51.711	51.816	51.922	52.027	52.132	52.238	52.343	52.448	52.553
45	52.658	52.763	52.868	52.973	53.078	53.182	53.287	53.392	53.496	53.601
46	53.705	53.809	53.914	54.018	54.122	54.226	54.330	54.434	54.538	54.642
47	54.746	54.850	54.954	55.057	55.161	55.264	55.368	55.471	55.574	55.677
48	55.780	55.883	55.986	56.089	56.192	56.295	56.398	56.500	56.603	56.706
49	56.803	56.910	57.013	57.116	57.218	57.320	57.422	57.522	57.626	57.728
50	57.830	57.932	58.034	58.135	58.237	58.338	58.440	58.541	58.642	58.743

TABLE 5.—Percentages by Volume at 60° F, Corresponding to Various Percentages by Weight in Mixtures of Ethyl Alcohol and Water—Continued

Per Cent Alcohol by Weight	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
50	57.830	57.932	58.034	58.135	58.237	58.338	58.440	58.541	58.642	58.743
51	58.844	58.945	59.046	59.147	59.248	59.349	59.450	59.550	59.651	59.752
52	59.852	59.952	60.053	60.154	60.254	60.354	60.454	60.554	60.654	60.754
53	60.854	60.954	61.054	61.154	61.254	61.353	61.453	61.552	61.652	61.751
54	61.850	61.949	62.048	62.147	62.246	62.344	62.443	62.542	62.640	62.738
55	62.837	62.936	63.034	63.132	63.231	63.329	63.427	63.526	63.624	63.722
56	63.820	63.918	64.016	64.114	64.212	64.310	64.408	64.505	64.603	64.701
57	64.798	64.895	64.993	65.090	65.188	65.285	65.382	65.479	65.575	65.672
58	65.768	65.865	65.961	66.058	66.154	66.251	66.347	66.444	66.540	66.636
59	66.732	66.828	66.924	67.020	67.116	67.212	67.308	67.404	67.499	67.595
60	67.690	67.785	67.881	67.976	68.071	68.166	68.261	68.356	68.451	68.546
61	68.641	68.736	68.831	68.925	69.020	69.115	69.209	69.304	69.398	69.492
62	69.586	69.590	69.774	69.868	69.962	70.056	70.149	70.243	70.336	70.430
63	70.523	70.616	70.710	70.803	70.897	70.990	71.083	71.176	71.269	71.362
64	71.455	71.548	71.641	71.733	71.826	71.918	72.011	72.103	72.196	72.288
65	72.380	72.472	72.564	72.656	72.748	72.840	72.932	73.024	73.116	73.207
66	73.299	73.391	73.482	73.574	73.665	73.756	73.847	73.938	74.029	74.120
67	74.211	74.302	74.393	74.484	74.575	74.665	74.756	74.846	74.937	75.027
68	75.117	75.207	75.297	75.387	75.477	75.567	75.657	75.747	75.837	75.926
69	76.016	76.106	76.195	76.285	76.374	76.464	76.553	76.642	76.731	76.820
70	76.909	76.998	77.087	77.176	77.264	77.353	77.441	77.529	77.618	77.706
71	77.794	77.882	77.970	78.058	78.146	78.234	78.322	78.410	78.497	78.584
72	78.672	78.760	78.847	78.934	79.022	79.109	79.196	79.283	79.370	79.457
73	79.544	79.631	79.718	79.805	79.892	79.978	80.065	80.151	80.238	80.324
74	80.410	80.496	80.582	80.668	80.754	80.840	80.926	81.012	81.098	81.183
75	81.269	81.355	81.440	81.526	81.611	81.696	81.781	81.866	81.951	82.036
76	82.121	82.206	82.291	82.376	82.461	82.545	82.630	82.714	82.799	82.883
77	82.967	83.051	83.135	83.219	83.303	83.387	83.471	83.555	83.638	83.722
78	83.805	83.888	83.972	84.055	84.138	84.221	84.304	84.387	84.470	84.553
79	84.636	84.719	84.801	84.884	84.966	85.049	85.131	85.213	85.295	85.377
80	85.459	85.541	85.623	85.705	85.787	85.868	85.950	86.031	86.113	86.194
81	86.275	86.356	86.437	86.518	86.599	86.680	86.761	86.842	86.922	87.002
82	87.083	87.164	87.244	87.324	87.405	87.485	87.565	87.645	87.725	87.805
83	87.885	87.965	88.045	88.124	88.204	88.283	88.362	88.441	88.520	88.599
84	88.678	88.757	88.836	88.915	88.994	89.072	89.151	89.229	89.308	89.386
85	89.464	89.542	89.620	89.698	89.776	89.854	89.932	90.009	90.086	90.163
86	90.240	90.317	90.394	90.471	90.548	90.625	90.702	90.779	90.855	90.932
87	91.008	91.084	91.161	91.237	91.313	91.388	91.464	91.540	91.615	91.691
88	91.766	91.841	91.917	91.992	92.068	92.143	92.218	92.293	92.367	92.442
89	92.517	92.591	92.666	92.740	92.814	92.888	92.962	93.035	93.108	93.181
90	93.254	93.327	93.400	93.473	93.546	93.619	93.692	93.764	93.837	93.910
91	93.982	94.054	94.126	94.198	94.270	94.342	94.414	94.486	94.557	94.629
92	94.700	94.771	94.842	94.913	94.984	95.055	95.126	95.196	95.267	95.337
93	95.407	95.477	95.547	95.617	95.687	95.757	95.826	95.896	95.965	96.034
94	96.103	96.172	96.241	96.310	96.378	96.447	96.515	96.583	96.652	96.720
95	96.787	96.855	96.922	96.990	97.057	97.125	97.192	97.259	97.326	97.392
96	97.459	97.526	97.592	97.658	97.724	97.790	97.856	97.921	97.987	98.052
97	98.117	98.182	98.247	98.312	98.376	98.440	98.505	98.569	98.633	98.696
98	98.759	98.822	98.886	98.949	99.012	99.075	99.137	99.200	99.262	99.324
99	99.386	99.448	99.510	99.572	99.633	99.695	99.756	99.817	99.878	99.939
100	100.000									

TABLE 6.—Percentages by Weight, Corresponding to Various Percentages by Volume at 60° F in Mixtures of Ethyl Alcohol and Water

Per Cent Alcohol by Volume at 60° F	Per Cent Alcohol by Weight	Differences	Per Cent Alcohol by Volume at 60° F	Per Cent Alcohol by Weight	Differences
0	0.000		50	42.487	
1	0.795	0.795	51	43.428	0.941
2	1.593	.798	52	44.374	.946
3	2.392	.799	53	45.326	.952
4	3.194	.802	54	46.283	.957
		.804			.962
5	3.998		55	47.245	
6	4.804	.806	56	48.214	.969
7	5.612	.808	57	49.187	.973
8	6.422	.810	58	50.167	.980
9	7.234	.812	59	51.154	.987
		.813			.993
10	8.047		60	52.147	
11	8.862	.815	61	53.146	.999
12	9.679	.817	62	54.152	1.006
13	10.497	.818	63	55.165	1.013
14	11.317	.820	64	56.184	1.019
		.821			1.024
15	12.138		65	57.208	
16	12.961	.823	66	58.241	1.033
17	13.786	.825	67	59.279	1.038
18	14.612	.826	68	60.325	1.046
19	15.440	.828	69	61.379	1.054
		.829			1.062
20	16.269		70	62.441	
21	17.100	.831	71	63.511	1.070
22	17.933	.833	72	64.588	1.077
23	18.768	.835	73	65.674	1.086
24	19.604	.836	74	66.768	1.094
		.839			1.102
25	20.443		75	67.870	
26	21.285	.842	76	68.982	1.112
27	22.127	.842	77	70.102	1.120
28	22.973	.846	78	71.234	1.132
29	23.820	.847	79	72.375	1.141
		.850			1.151
30	24.670		80	73.526	
31	25.524	.854	81	74.686	1.160
32	26.382	.858	82	75.858	1.172
33	27.242	.860	83	77.039	1.181
34	28.104	.862	84	78.233	1.194
		.867			1.208
35	28.971		85	79.441	
36	29.842	.871	86	80.662	1.221
37	30.717	.875	87	81.897	1.235
38	31.596	.879	88	83.144	1.247
39	32.478	.882	89	84.408	1.264
		.886			1.281
40	33.364		90	85.689	
41	34.254	.890	91	86.989	1.300
42	35.150	.896	92	88.310	1.321
43	36.050	.900	93	89.652	1.342
44	36.955	.905	94	91.025	1.373
		.910			1.398
45	37.865		95	92.423	
46	38.778	.913	96	93.851	1.428
47	39.697	.919	97	95.315	1.464
48	40.622	.925	98	96.820	1.505
49	41.551	.929	99	98.381	1.561
		.936			1.619
50	42.487		100	100.000	

TABLE 8.—Density at 15° C of Mixtures (by weight) of Methyl Alcohol and Water

[Calculated from the specific gravity determinations of Doroshevskii and Rozhdestvenskii at $\frac{15^\circ}{15^\circ}\text{C}^\circ$]

Per Cent Methyl Alcohol by Weight	D ₄ ^{15°} C	Differences	Per Cent Methyl Alcohol by Weight	D ₄ ^{15°} C	Differences
0	.99913		50	.91852	
1	.99727	0.00186	51	.91653	0.00199
2	.99543	184	52	.91451	202
3	.99370	173	53	.91248	203
4	.99198	172	54	.91044	204
		169			205
5	.99029		55	.90839	
6	.98864	165	56	.90631	208
7	.98701	163	57	.90421	210
8	.98547	154	58	.90210	211
9	.98394	153	59	.89996	214
		153			215
10	.98241		60	.89781	
11	.98093	148	61	.89563	218
12	.97945	148	62	.89341	222
13	.97802	143	63	.89117	224
14	.97660	142	64	.88890	227
		142			228
15	.97518		65	.88662	
16	.97377	141	66	.88433	229
17	.97237	140	67	.88203	230
18	.97096	141	68	.87971	232
19	.96955	141	69	.87739	232
		141			232
20	.96814		70	.87507	
21	.96673	141	71	.87271	236
22	.96533	140	72	.87033	238
23	.96392	141	73	.86792	241
24	.96251	141	74	.86546	246
		143			246
25	.96108		75	.86300	
26	.95963	145	76	.86051	249
27	.95817	146	77	.85801	250
28	.95668	149	78	.85551	250
29	.95518	150	79	.85300	251
		152			252
30	.95366		80	.85048	
31	.95213	153	81	.84794	254
32	.95056	157	82	.84536	258
33	.94896	160	83	.84274	262
34	.94734	162	84	.84009	265
		164			267
35	.94570		85	.83742	
36	.94404	166	86	.83475	267
37	.94237	167	87	.83207	268
38	.94067	170	88	.82937	270
39	.93894	173	89	.82667	270
		174			271
40	.93720		90	.82396	
41	.93543	177	91	.82124	272
42	.93365	178	92	.81849	275
43	.93185	180	93	.81568	281
44	.93001	184	94	.81285	283
		186			286
45	.92815		95	.80999	
46	.92627	188	96	.80713	286
47	.92436	191	97	.80428	285
48	.92242	194	98	.80143	285
49	.92048	194	99	.79859	284
		196			282
50	.91852		100	.79577	

³ J. Russ., Phys. Chem. Soc., 41, pp. 977-996; 1909.

TABLE 9.—Specific Gravity at $\frac{15^\circ}{15^\circ}$ C of Mixtures (by Volume) of Methyl Alcohol and Water

[Calculated from the same data as Table 8]

Per Cent Methyl Alcohol by Volume at 15 C	D $\frac{15^\circ}{15^\circ}$ C	Differences	Per Cent Methyl Alcohol by Volume at 15 C	D $\frac{15^\circ}{15^\circ}$ C	Differences
0	1.00000		50	0.93326	
1	.99851	0.00149	51	.93155	0.00171
2	.99703	148	52	.92982	173
3	.99560	143	53	.92806	176
4	.99422	138	54	.92626	180
		139			183
5	.99283		55	.92443	
6	.99146	137	56	.92256	187
7	.99011	135	57	.92067	189
8	.98877	134	58	.91877	190
9	.98746	131	59	.91682	195
		125			199
10	.98621		60	.91483	
11	.98496	125	61	.91282	201
12	.98370	126	62	.91079	203
13	.98247	123	63	.90873	206
14	.98125	122	64	.90663	210
		122			213
15	.98003		65	.90450	
16	.97884	119	66	.90234	216
17	.97766	118	67	.90014	220
18	.97648	118	68	.89790	224
19	.97530	118	69	.89561	229
		117			234
20	.97413		70	.89327	
21	.97295	118	71	.89088	239
22	.97177	118	72	.88844	244
23	.97058	119	73	.88596	248
24	.96939	119	74	.88346	250
		119			254
25	.96820		75	.88092	
26	.96700	120	76	.87836	256
27	.96580	120	77	.87578	258
28	.96459	121	78	.87312	266
29	.96338	121	79	.87040	272
		122			280
30	.96216		80	.86760	
31	.96091	125	81	.86474	286
32	.95966	125	82	.86180	294
33	.95838	128	83	.85883	297
34	.95708	130	84	.85582	301
		132			306
35	.95576		85	.85276	
36	.95443	133	86	.84967	309
37	.95308	135	87	.84646	321
38	.95170	138	88	.84314	332
39	.95029	141	89	.83971	343
		143			348
40	.94886		90	.83623	
41	.94741	145	91	.83269	354
42	.94593	148	92	.82907	362
43	.94443	150	93	.82538	369
44	.94291	152	94	.82163	375
		155			391
45	.94136		95	.81772	
46	.93979	157	96	.81363	409
47	.93820	159	97	.80942	421
48	.93657	163	98	.80514	428
49	.93493	164	99	.80082	432
		167			435
50	.93326		100	.79647	

TABLE 10.—Percentages by Volume at 15° C, Corresponding to Various Percentages by Weight in Mixtures of Methyl Alcohol and Water

Per Cent by Weight	Per Cent by Volume at 15° C	Differences	Per Cent by Weight	Per Cent by Volume at 15° C	Differences
0	0.000		50	57.712	
1	1.253	1.253	51	58.739	1.027
2	2.502	1.249	52	59.759	1.020
3	3.746	1.244	53	60.773	1.014
4	4.986	1.240	54	61.781	1.008
		1.236			1.002
5	6.222		55	62.783	
6	7.454	1.232	56	63.778	.995
7	8.682	1.228	57	64.767	.989
8	9.907	1.225	58	65.750	.983
9	11.128	1.221	59	66.725	.975
		1.217			.968
10	12.345		60	67.693	
11	13.559	1.214	61	68.654	.961
12	14.770	1.211	62	69.607	.953
13	15.977	1.207	63	70.552	.945
14	17.181	1.204	64	71.490	.938
		1.201			.930
15	18.382		65	72.420	
16	19.579	1.197	66	73.344	.924
17	20.773	1.194	67	74.262	.918
18	21.963	1.190	68	75.172	.910
19	23.149	1.186	69	76.077	.905
		1.183			.899
20	24.332		70	76.976	
21	25.512	1.180	71	77.864	.888
22	26.688	1.176	72	78.746	.882
23	27.860	1.172	73	79.618	.872
24	29.029	1.169	74	80.480	.862
		1.164			.856
25	30.193		75	81.336	
26	31.354	1.161	76	82.182	.846
27	32.510	1.156	77	83.022	.840
28	33.662	1.152	78	83.855	.833
29	34.809	1.147	79	84.680	.825
		1.143			.815
30	35.952		80	85.499	
31	37.091	1.139	81	86.310	.811
32	38.224	1.133	82	87.110	.800
33	39.352	1.128	83	87.899	.789
34	40.476	1.124	84	88.677	.778
		1.118			.771
35	41.594		85	89.448	
36	42.708	1.114	86	90.212	.764
37	43.816	1.108	87	90.968	.756
38	44.919	1.103	88	91.716	.748
39	46.016	1.097	89	92.456	.740
		1.093			.732
40	47.109		90	93.188	
41	48.195	1.086	91	93.912	.724
42	49.277	1.082	92	94.627	.715
43	50.353	1.076	93	95.326	.699
44	51.422	1.069	94	96.017	.691
		1.064			.680
45	52.486		95	96.697	
46	53.544	1.058	96	97.370	.673
47	54.595	1.051	97	98.036	.666
48	55.639	1.044	98	98.696	.660
49	56.678	1.039	99	99.351	.655
		1.034			.649
50	57.712		100	100.000	

TABLE 11.—Temperature Corrections to Readings of Saccharometers (Standard at 20° C)

[This table is calculated using the data on thermal expansion of sugar solutions by Plato⁴, assuming the instrument to be of Jena 16^{III} glass. The table should be used with caution and only for approximate results when the temperature differs much from the standard temperature or from the temperature of the surrounding air]

Temperature in Degrees Centigrade	Observed Per Cent of Sugar													
	0	5	10	15	20	25	30	35	40	45	50	55	60	70
	Subtract from Observed Per cent													
0	0.30	0.49	0.65	0.77	0.89	0.99	1.08	1.16	1.24	1.31	1.37	1.41	1.44	1.49
5	.36	.47	.56	.65	.73	.80	.86	.91	.97	1.01	1.05	1.08	1.10	1.14
10	.32	.38	.43	.48	.52	.57	.60	.64	.67	.70	.72	.74	.75	.77
11	.31	.35	.40	.44	.48	.51	.55	.58	.60	.63	.65	.66	.68	.70
12	.29	.32	.36	.40	.43	.46	.50	.52	.54	.56	.58	.59	.60	.62
13	.26	.29	.32	.35	.38	.41	.44	.46	.48	.49	.51	.52	.53	.55
14	.24	.26	.29	.31	.34	.36	.38	.40	.41	.42	.44	.45	.46	.47
15	.20	.22	.24	.26	.28	.30	.32	.33	.34	.36	.36	.37	.38	.39
16	.17	.18	.20	.22	.23	.25	.26	.27	.28	.28	.29	.30	.31	.32
17	.13	.14	.15	.16	.18	.19	.20	.20	.21	.21	.22	.23	.23	.24
18	.09	.10	.10	.11	.12	.13	.13	.14	.14	.14	.15	.15	.15	.16
19	.05	.05	.05	.06	.06	.06	.07	.07	.07	.07	.08	.08	.08	.08
17.5	.11	.12	.12	.14	.15	.16	.16	.17	.17	.18	.18	.19	.19	.20
15.56 (60° F)	.18	.20	.22	.24	.26	.28	.29	.30	.30	.32	.33	.33	.34	.34
	Add to Observed Per Cent													
	0.04	0.05	0.06	0.06	0.06	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09
	.10	.10	.11	.12	.12	.13	.14	.14	.15	.15	.16	.16	.16	.16
21	.16	.16	.17	.17	.19	.20	.21	.21	.22	.23	.24	.24	.24	.24
22	.21	.22	.23	.24	.26	.27	.28	.29	.30	.31	.32	.32	.32	.32
23	.27	.28	.30	.31	.32	.34	.35	.36	.38	.38	.39	.39	.40	.39
24	.33	.34	.36	.37	.40	.40	.42	.44	.46	.47	.47	.48	.48	.48
25	.40	.41	.42	.44	.46	.48	.50	.52	.54	.55	.56	.56	.56	.56
26	.46	.47	.49	.51	.54	.56	.58	.60	.61	.62	.63	.64	.64	.64
27	.54	.55	.56	.59	.61	.63	.66	.68	.70	.70	.71	.72	.72	.72
28	.61	.62	.63	.66	.68	.71	.73	.76	.78	.78	.79	.80	.80	.81
29														
30														
35	.99	1.01	1.02	1.06	1.10	1.13	1.16	1.18	1.20	1.21	1.22	1.22	1.23	1.22
40	1.42	1.45	1.47	1.51	1.54	1.57	1.60	1.62	1.64	1.65	1.65	1.65	1.66	1.65
45	1.91	1.94	1.96	2.00	2.03	2.05	2.07	2.09	2.10	2.10	2.10	2.10	2.10	2.08
50	2.46	2.48	2.50	2.53	2.56	2.57	2.58	2.59	2.59	2.58	2.58	2.57	2.56	2.52
55	3.05	3.07	3.09	3.12	3.12	3.12	3.12	3.11	3.10	3.08	3.07	3.05	3.03	2.97
60	3.69	3.72	3.73	3.73	3.72	3.70	3.67	3.65	3.62	3.60	3.57	3.54	3.50	3.43
27.5	0.43	0.44	0.46	0.48	0.50	0.52	0.54	0.56	0.58	0.58	0.59	0.60	0.60	0.60

⁴ Wiss. Abh. der Kaiserlichen Normal-Eichungs-Kommission, 2, p. 140; 1900.

TABLE 12.—Density⁵ of Solutions of Cane Sugar at 20° C

[This table is the basis for standardizing hydrometers indicating per cent of sugar at 20° C]

Per Cent Sugar	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
0	0.998234	0.998622	0.999010	0.999398	0.999786	1.000174	1.000563	1.000952	1.001342	1.001731
1	1.002120	1.002509	1.002897	1.003286	1.003675	1.004064	1.004453	1.004844	1.005234	1.005624
2	1.006015	1.006405	1.006796	1.007188	1.007580	1.007972	1.008363	1.008755	1.009148	1.009541
3	1.009934	1.010327	1.010721	1.011115	1.011510	1.011904	1.012298	1.012694	1.013089	1.013485
4	1.013881	1.014277	1.014673	1.015070	1.015467	1.015864	1.016261	1.016659	1.017058	1.017456
5	1.017854	1.018253	1.018652	1.019052	1.019451	1.019851	1.020251	1.020651	1.021053	1.021454
6	1.021855	1.022257	1.022659	1.023061	1.023463	1.023867	1.024270	1.024673	1.025077	1.025481
7	1.025885	1.026289	1.026694	1.027099	1.027504	1.027910	1.028316	1.028722	1.029128	1.029535
8	1.029942	1.030349	1.030757	1.031165	1.031573	1.031982	1.032391	1.032800	1.033209	1.033619
9	1.034029	1.034439	1.034850	1.035260	1.035671	1.036082	1.036494	1.036906	1.037318	1.037730
10	1.038143	1.038556	1.038970	1.039383	1.039797	1.040212	1.040626	1.041041	1.041456	1.041872
11	1.042288	1.042704	1.043121	1.043537	1.043954	1.044370	1.044788	1.045206	1.045625	1.046043
12	1.046462	1.046881	1.047300	1.047720	1.048140	1.048559	1.048980	1.049401	1.049822	1.050243
13	1.050665	1.051087	1.051510	1.051933	1.052356	1.052779	1.053202	1.053626	1.054050	1.054475
14	1.054900	1.055325	1.055751	1.056176	1.056602	1.057028	1.057455	1.057882	1.058310	1.058737
15	1.059165	1.059593	1.060022	1.060451	1.060880	1.061308	1.061738	1.062168	1.062598	1.063029
16	1.063460	1.063892	1.064324	1.064756	1.065188	1.065621	1.066054	1.066487	1.066921	1.067355
17	1.067789	1.068223	1.068658	1.069093	1.069529	1.069964	1.070400	1.070836	1.071273	1.071710
18	1.072147	1.072585	1.073023	1.073461	1.073900	1.074338	1.074777	1.075217	1.075657	1.076097
19	1.076537	1.076978	1.077419	1.077860	1.078302	1.078744	1.079187	1.079629	1.080072	1.080515
20	1.080959	1.081403	1.081848	1.082292	1.082737	1.083182	1.083628	1.084074	1.084520	1.084967
21	1.085414	1.085861	1.086309	1.086757	1.087205	1.087652	1.088101	1.088550	1.089000	1.089450
22	1.089900	1.090351	1.090802	1.091253	1.091704	1.092155	1.092607	1.093060	1.093513	1.093966
23	1.094420	1.094874	1.095328	1.095782	1.096236	1.096691	1.097147	1.097603	1.098058	1.098514
24	1.098971	1.099428	1.099886	1.100344	1.100802	1.101259	1.101718	1.102177	1.102637	1.103097
25	1.103557	1.104017	1.104478	1.104938	1.105400	1.105862	1.106324	1.106786	1.107248	1.107711
26	1.108175	1.108639	1.109103	1.109568	1.110033	1.110497	1.110963	1.111429	1.111895	1.112361
27	1.112828	1.113295	1.113763	1.114229	1.114697	1.115166	1.115635	1.116104	1.116572	1.117042
28	1.117512	1.117982	1.118453	1.118923	1.119395	1.119867	1.120339	1.120812	1.121284	1.121757
29	1.122231	1.122705	1.123179	1.123653	1.124128	1.124603	1.125079	1.125555	1.126030	1.126507
30	1.126984	1.127461	1.127939	1.128417	1.128896	1.129374	1.129853	1.130332	1.130812	1.131292
31	1.131773	1.132254	1.132735	1.133216	1.133698	1.134180	1.134663	1.135146	1.135628	1.136112
32	1.136596	1.137080	1.137565	1.138049	1.138534	1.139020	1.139506	1.139993	1.140479	1.140966
33	1.141453	1.141941	1.142429	1.142916	1.143405	1.143894	1.144384	1.144874	1.145363	1.145854
34	1.146345	1.146836	1.147328	1.147820	1.148313	1.148805	1.149298	1.149792	1.150286	1.150780
35	1.151275	1.151770	1.152265	1.152760	1.153256	1.153752	1.154249	1.154746	1.155242	1.155740
36	1.156238	1.156736	1.157235	1.157733	1.158233	1.158733	1.159233	1.159733	1.160233	1.160734
37	1.161236	1.161738	1.162240	1.162742	1.163245	1.163748	1.164252	1.164756	1.165259	1.165764
38	1.166269	1.166775	1.167281	1.167786	1.168293	1.168800	1.169307	1.169815	1.170322	1.170831
39	1.171340	1.171849	1.172359	1.172869	1.173379	1.173889	1.174400	1.174911	1.175423	1.175935
40	1.176447	1.176960	1.177473	1.177987	1.178501	1.179014	1.179527	1.180044	1.180560	1.181076
41	1.181592	1.182108	1.182625	1.183142	1.183660	1.184178	1.184696	1.185215	1.185734	1.186253
42	1.186773	1.187293	1.187814	1.188335	1.188856	1.189379	1.189901	1.190423	1.190946	1.191469
43	1.191993	1.192517	1.193041	1.193565	1.194090	1.194616	1.195141	1.195667	1.196193	1.196720
44	1.197247	1.197775	1.198303	1.198832	1.199360	1.199890	1.200420	1.200950	1.201480	1.202010
45	1.202540	1.203071	1.203603	1.204136	1.204668	1.205200	1.205733	1.206266	1.206801	1.207335
46	1.207870	1.208405	1.208940	1.209477	1.210013	1.210549	1.211086	1.211623	1.212162	1.212700
47	1.213238	1.213777	1.214317	1.214856	1.215395	1.215936	1.216476	1.217017	1.217559	1.218101
48	1.218643	1.219185	1.219729	1.220272	1.220815	1.221360	1.221904	1.222449	1.222995	1.223540
49	1.224086	1.224632	1.225180	1.225727	1.226274	1.226823	1.227371	1.227919	1.228469	1.229018
50	1.229567	1.230117	1.230668	1.231219	1.231770	1.232322	1.232874	1.233426	1.233979	1.234532

⁵ According to Dr. F. Plato (Wiss. Abh. der Kaiserlichen Normal-Eichungs-Kommission, 2, p. 153; 1900).

TABLE 12.—Density of Solutions of Cane Sugar at 20° C—Continued

Per Cent Sugar	Tenths of Per Cent									
	0	1	2	3	4	5	6	7	8	9
50	1.229567	1.230117	1.230668	1.231219	1.231770	1.232322	1.232874	1.233426	1.233979	1.234532
51	1.235085	1.235639	1.236194	1.236748	1.237303	1.237859	1.238414	1.238970	1.239527	1.240084
52	1.240641	1.241198	1.241757	1.242315	1.242873	1.243433	1.243992	1.244552	1.245113	1.245673
53	1.246234	1.246795	1.247358	1.247920	1.248482	1.249046	1.249609	1.250172	1.250737	1.251301
54	1.251866	1.252431	1.252997	1.253563	1.254129	1.254697	1.255264	1.255831	1.256400	1.256967
55	1.257535	1.258104	1.258674	1.259244	1.259815	1.260385	1.260955	1.261527	1.262099	1.262671
56	1.263243	1.263816	1.264390	1.264963	1.265537	1.266112	1.266686	1.267261	1.267837	1.268413
57	1.268989	1.269565	1.270143	1.270720	1.271299	1.271877	1.272455	1.273035	1.273614	1.274194
58	1.274774	1.275354	1.275936	1.276517	1.277098	1.277680	1.278262	1.278844	1.279428	1.280011
59	1.280595	1.281179	1.281764	1.282349	1.282935	1.283521	1.284107	1.284694	1.285281	1.285869
60	1.286456	1.287044	1.287633	1.288222	1.288811	1.289401	1.289991	1.290581	1.291172	1.291763
61	1.292354	1.292946	1.293539	1.294131	1.294725	1.295318	1.295911	1.296506	1.297100	1.297696
62	1.298291	1.298886	1.299483	1.300079	1.300677	1.301274	1.301871	1.302470	1.303068	1.303668
63	1.304267	1.304867	1.305467	1.306068	1.306669	1.307271	1.307872	1.308475	1.309077	1.309680
64	1.310282	1.310885	1.311489	1.312093	1.312699	1.313304	1.313909	1.314515	1.315121	1.315728
65	1.316334	1.316941	1.317549	1.318157	1.318766	1.319374	1.319983	1.320593	1.321203	1.321814
66	1.322425	1.323036	1.323648	1.324259	1.324872	1.325484	1.326097	1.326711	1.327325	1.327940
67	1.328554	1.329170	1.329785	1.330401	1.331017	1.331633	1.332250	1.332868	1.333485	1.334103
68	1.334722	1.335342	1.335961	1.336581	1.337200	1.337821	1.338441	1.339063	1.339684	1.340306
69	1.340928	1.341551	1.342174	1.342798	1.343421	1.344046	1.344671	1.345296	1.345922	1.346547
70	1.347174	1.347801	1.348427	1.349055	1.349682	1.350311	1.350939	1.351568	1.352197	1.352827
71	1.353456	1.354087	1.354717	1.355349	1.355980	1.356612	1.357245	1.357877	1.358511	1.359144
72	1.359778	1.360413	1.361047	1.361682	1.362317	1.362953	1.363590	1.364226	1.364864	1.365501
73	1.366139	1.366777	1.367415	1.368054	1.368693	1.369333	1.369973	1.370613	1.371254	1.371894
74	1.372536	1.373178	1.373820	1.374463	1.375105	1.375749	1.376392	1.377036	1.377680	1.378326
75	1.378971	1.379617	1.380262	1.380909	1.381555	1.382203	1.382851	1.383499	1.384148	1.384796
76	1.385446	1.386096	1.386746	1.387396	1.388045	1.388696	1.389347	1.389997	1.390651	1.391303
77	1.391956	1.392610	1.393263	1.393917	1.394571	1.395226	1.395881	1.396536	1.397192	1.397848
78	1.398505	1.399162	1.399819	1.400477	1.401134	1.401793	1.402452	1.403111	1.403771	1.404430
79	1.405091	1.405752	1.406412	1.407074	1.407735	1.408398	1.409061	1.409723	1.410387	1.411051
80	1.411715	1.412380	1.413044	1.413709	1.414374	1.415040	1.415706	1.416373	1.417039	1.417707
81	1.418374	1.419043	1.419711	1.420380	1.421049	1.421719	1.422390	1.423059	1.423730	1.424400
82	1.425072	1.425744	1.426416	1.427089	1.427761	1.428435	1.429109	1.429787	1.430457	1.431131
83	1.431807	1.432483	1.433158	1.433835	1.434511	1.435188	1.435866	1.436543	1.437222	1.437900
84	1.438579	1.439259	1.439938	1.440619	1.441299	1.441980	1.442661	1.443342	1.444024	1.444705
85	1.445388	1.446071	1.446754	1.447438	1.448121	1.448806	1.449491	1.450175	1.450860	1.451545
86	1.452232	1.452919	1.453605	1.454292	1.454980	1.455668	1.456357	1.457045	1.457735	1.458424
87	1.459114	1.459805	1.460495	1.461186	1.461877	1.462568	1.463260	1.463953	1.464645	1.465338
88	1.466032	1.466726	1.467420	1.468115	1.468810	1.469504	1.470200	1.470896	1.471592	1.472289
89	1.472986	1.473684	1.474381	1.475080	1.475779	1.476477	1.477176	1.477876	1.478575	1.479275
90	1.479976	1.480677	1.481378	1.482080	1.482782	1.483484	1.484187	1.484890	1.485593	1.486297
91	1.487002	1.487707	1.488411	1.489117	1.489823	1.490528	1.491234	1.491941	1.492647	1.493355
92	1.494063	1.494771	1.495479	1.496188	1.496897	1.497606	1.498316	1.499026	1.499736	1.500447
93	1.501158	1.501870	1.502582	1.503293	1.504007	1.504719	1.505432	1.506146	1.506859	1.507574
94	1.508289	1.509004	1.509720	1.510435	1.511151	1.511868	1.512585	1.513302	1.514019	1.514737
95	1.515455	1.516174	1.516893	1.517612	1.518332	1.519051	1.519771	1.520492	1.521212	1.521934
96	1.522656	1.523378	1.524100	1.524823	1.525546	1.526269	1.526993	1.527717	1.528441	1.529166
97	1.529891	1.530616	1.531342	1.532068	1.532794	1.533521	1.534248	1.534976	1.535704	1.536432
98	1.537161	1.537889	1.538618	1.539347	1.540076	1.540806	1.541536	1.542267	1.542998	1.543730
99	1.544462	1.545194	1.545926	1.546659	1.547392	1.548127	1.548861	1.549595	1.550329	1.551064
100	1.551800									

TABLE 13.—Density of Solutions of Sulphuric Acid (H_2SO_4) at 20°C [Calculated from Dr. J. Domke's table.⁶ Adopted as the basis for standardization of hydrometers indicating per cent of sulphuric acid at 20°C]

Per Cent H_2SO_4	$D_{4}^{20} \text{C}$	Per Cent H_2SO_4	$D_{4}^{20} \text{C}$	Per Cent H_2SO_4	$D_{4}^{20} \text{C}$
0	0.99823	50	1.39505	91.0	1.81950
1	1.00506	51	1.40487	91.2	1.82045
2	1.01178	52	1.41481	91.4	1.82137
3	1.01839	53	1.42487	91.6	1.82227
4	1.02500	54	1.43503	91.8	1.82315
5	1.03168	55	1.44530	92.0	1.82401
6	1.03843	56	1.45568	92.2	1.82484
7	1.04527	57	1.46615	92.4	1.82564
8	1.05216	58	1.47673	92.6	1.82641
9	1.05909	59	1.48740	92.8	1.82717
10	1.06609	60	1.49818	93.0	1.82790
11	1.07314	61	1.50904	93.2	1.82860
12	1.08026	62	1.51999	93.4	1.82928
13	1.08744	63	1.53102	93.6	1.82993
14	1.09468	64	1.54213	93.8	1.83055
15	1.10199	65	1.55333	94.0	1.83115
16	1.10936	66	1.56460	94.2	1.83172
17	1.11679	67	1.57595	94.4	1.83226
18	1.12428	68	1.58739	94.6	1.83276
19	1.13183	69	1.59890	94.8	1.83324
20	1.13943	70	1.61048	95.0	1.83368
21	1.14709	71	1.62213	95.1	1.83389
22	1.15480	72	1.63384	95.2	1.83410
23	1.16258	73	1.64560	95.3	1.83430
24	1.17041	74	1.65738	95.4	1.83449
25	1.17830	75	1.66917	95.5	1.83469
26	1.18624	76	1.68095	95.6	1.83486
27	1.19423	77	1.69268	95.7	1.83503
28	1.20227	78	1.70433	95.8	1.83520
29	1.21036	79	1.71585	95.9	1.83534
30	1.21850	80	1.72717	96.0	1.83548
31	1.22669	81	1.73827	96.1	1.83560
32	1.23492	82	1.74904	96.2	1.83572
33	1.24320	83	1.75943	96.3	1.83584
34	1.25154	84	1.76932	96.4	1.83594
35	1.25992	85	1.77860	96.5	1.83604
36	1.26836	85.5	1.78300	96.6	1.83613
37	1.27685	86	1.78721	96.7	1.83621
38	1.28543	86.5	1.79124	96.8	1.83628
39	1.29407	87	1.79509	96.9	1.83634
40	1.30278	87.5	1.79875	97.0	1.83637
41	1.31157	88	1.80223	97.1	1.83639
42	1.32043	88.5	1.80552	97.2	1.83640
43	1.32938	89	1.80864	97.3	1.83640
44	1.33843	89.5	1.81159	97.4	1.83639
45	1.34759	90	1.81438	97.5	1.83637
46	1.35686	90.2	1.81545	97.6	1.83634
47	1.36625	90.4	1.81650	97.7	1.83629
48	1.37574	90.6	1.81753	97.8	1.83623
49	1.38533	90.8	1.81853	97.9	1.83615
50	1.39505	91.0	1.81950	98.0	1.83605

⁶ Wiss. Abh. der Kaiserlichen Normal-Eichungs-Kommission, 5, p. 131; 1900.

TABLE 14.—Temperature Corrections to Per Cent of Sulphuric Acid Determined by Hydrometer (Standard at 20° C)

[Calculated from the same data as the preceding table, assuming Jena 16^{III} glass as the material used. The table should be used with caution, and only for approximate results when the temperature differs much from the standard temperature or from the temperature of the surrounding air]

Observed Per Cent H ₂ SO ₄	Temperature in Degrees Centigrade											
	0	5	10	15	25	30	35	40	45	50	55	60
	Subtract from Observed Per Cent				Add to Observed Per Cent							
0					0.16	0.35	0.59	0.86	1.17	1.5	1.9	2.1
5	0.59	0.49	0.36	0.20	0.24	0.50	0.79	1.11	1.45	1.8	2.2	2.6
10	0.92	0.72	0.51	0.27	0.29	0.60	0.93	1.28	1.65	2.0	2.4	2.8
20	1.39	1.06	0.72	0.36	0.37	0.75	1.14	1.53	1.93	2.3	2.7	3.1
30	1.64	1.23	0.82	0.41	0.41	0.82	1.24	1.65	2.07	2.5	2.9	3.3
40	1.65	1.24	0.82	0.41	0.41	0.82	1.22	1.62	2.03	2.4	2.8	3.2
50	1.56	1.17	0.78	0.39	0.38	0.77	1.15	1.52	1.90	2.3	2.6	3.0
60	1.52	1.14	0.76	0.38	0.37	0.74	1.11	1.48	1.84	2.2	2.6	2.9
70	1.54	1.15	0.76	0.38	0.38	0.75	1.13	1.50	1.86	2.2	2.6	3.0
80	1.72	1.30	0.87	0.44	0.45	0.90	1.36	1.83	2.31	2.8	3.3	3.8
81	1.76	1.34	0.92	0.44	0.47	0.93	1.42	1.93	2.44	3.0	3.5	4.0
82	1.84	1.41	0.96	0.47	0.50	1.00	1.51	2.04	2.58	3.1	3.7	4.3
83	1.94	1.48	1.00	0.50	0.53	1.06	1.59	2.18	2.78	3.4	4.0	4.6
84	2.05	1.57	1.06	0.53	0.55	1.12	1.74	2.36	3.0	3.7	4.4	5.1
85	2.20	1.67	1.13	0.57	0.61	1.23	1.88	2.57	3.3	4.0	4.9	5.8
86	2.36	1.80	1.22	0.62	0.66	1.35	2.08	2.84	3.7	4.6	5.5	
87	2.54	1.95	1.32	0.67	0.73	1.50	2.31	3.2	4.1	5.2		
88	2.75	2.12	1.44	0.74	0.81	1.67	2.59	3.6	4.7	6.0		
89	3.01	2.31	1.58	0.82	0.89	1.86	2.91	4.1	5.6			
90	3.27	2.53	1.73	0.91	0.99	2.10	3.4	4.9				
91	3.57	2.78	1.93	1.01	1.13	2.44	4.1					
92	3.91	3.06	2.13	1.12	1.32	3.00						
93	4.29	3.38	2.37	1.26	1.64							
94	4.75	3.77	2.69	1.46								
95	5.29	4.26	3.12	1.76								
96	5.96	4.88	3.65	2.19								
97	6.78	5.68	4.42	2.90								

TABLE 15.—Temperature Corrections to Readings of Specific Gravity Hydrometers in American Petroleum Oils at Various Temperatures

[Standard at 60°/60° F]

Observed Temperature °F	Observed Specific Gravity						
	0.650	0.700	0.750	0.800	0.850	0.900	0.950
	Subtract from Observed Specific Gravity						
30	0.016	0.015	0.014	0.012	0.011	0.011	0.011
32	.015	.014	.013	.012	.011	.010	.010
34	.014	.013	.012	.011	.010	.010	.010
36	.013	.012	.011	.010	.009	.009	.009
38	.012	.011	.010	.009	.008	.008	.008
40	.0105	.0095	.0090	.0080	.0075	.0070	.0070
42	.0095	.0085	.0080	.0070	.0065	.0065	.0065
44	.0085	.0075	.0070	.0065	.0060	.0060	.0055
46	.0075	.0065	.0060	.0055	.0050	.0050	.0050
48	.0065	.0060	.0055	.0050	.0045	.0045	.0040
50	.0050	.0050	.0045	.0040	.0035	.0035	.0035
52	.0040	.0040	.0035	.0030	.0030	.0030	.0030
54	.0030	.0030	.0025	.0025	.0020	.0020	.0020
56	.0020	.0020	.0020	.0015	.0015	.0015	.0015
58	.0010	.0010	.0010	.0005	.0005	.0005	.0005
Add to Observed Specific Gravity							
60	.0000	.0000	.0000	.0000	.0000	.0000	.0000
62	.0010	.0010	.0010	.0005	.0005	.0005	.0005
64	.0020	.0020	.0015	.0015	.0015	.0015	.0015
66	.0030	.0030	.0025	.0025	.0020	.0020	.0020
68	.0040	.0040	.0035	.0030	.0030	.0030	.0030
70	.0050	.0050	.0045	.0040	.0040	.0035	.0035
72	.0060	.0055	.0050	.0045	.0045	.0040	.0040
74	.0070	.0065	.0060	.0055	.0050	.0050	.0050
76	.0080	.0075	.0070	.0065	.0060	.0055	.0055
78	.0090	.0085	.0080	.0070	.0065	.0065	.0065
80	.010	.009	.008	.008	.007	.007	.007
82	.011	.010	.009	.008	.008	.007	.007
84	.012	.011	.010	.009	.009	.008	.008
86	.013	.012	.011	.010	.009	.009	.009
88	.014	.013	.012	.011	.010	.010	.010
90	.015	.014	.013	.012	.011	.010	.010
92	.016	.015	.013	.012	.011	.011	.011
94	.017	.016	.014	.013	.012	.012	.012
96	.018	.016	.015	.014	.013	.013	.013
98	.019	.017	.016	.015	.014	.013	.013
100	.020	.018	.017	.015	.014	.014	.014
102	.021	.019	.018	.016	.015	.015	.015
104	.022	.020	.018	.017	.016	.015	.015
106	.023	.021	.019	.017	.016	.016	.016
108	.024	.022	.020	.018	.017	.017	.017
110	.025	.023	.021	.019	.018	.017	.017
112	.026	.024	.022	.020	.019	.018	.018
114	.027	.025	.022	.020	.019	.019	.019
116	.028	.026	.023	.021	.020	.019	.019
118	.029	.026	.024	.022	.021	.020	.020
120	.030	.027	.025	.023	.022	.021	.021

(This table is calculated from the same data as Table I, Circular No. 57, Bureau of Standards.)

TABLE 16.—Temperature Corrections to Readings of Baumé Hydrometers in American Petroleum Oils at Various Temperatures

[Standard at 60° F; Modulus 140]

Observed Temperature ° F	Observed Degrees Baumé							
	20.0	30.0	40.0	50.0	60.0	70.0	80.0	90.0
Add to Observed Degrees Baumé								
30	1.7	2.0	2.4	3.0	3.7	4.3	5.0	5.7
32	1.6	1.9	2.3	2.8	3.4	4.0	4.7	5.3
34	1.5	1.8	2.1	2.6	3.1	3.7	4.3	4.9
36	1.4	1.6	2.0	2.4	2.9	3.4	4.0	4.6
38	1.3	1.5	1.8	2.2	2.6	3.1	3.6	4.2
40	1.2	1.4	1.6	2.0	2.4	2.8	3.2	3.8
42	1.1	1.2	1.5	1.8	2.2	2.5	2.9	3.4
44	.9	1.1	1.3	1.6	2.0	2.2	2.6	3.0
46	.8	.9	1.1	1.4	1.7	1.9	2.3	2.7
48	.7	.8	.9	1.2	1.4	1.6	2.0	2.3
50	.6	.7	.8	1.0	1.2	1.4	1.6	1.9
52	.5	.6	.7	.8	1.0	1.1	1.3	1.5
54	.3	.4	.5	.6	.8	.9	1.0	1.1
56	.2	.3	.3	.4	.5	.6	.6	.7
58	.1	.1	.1	.2	.3	.3	.3	.4
Subtract from Observed Degrees Baumé								
60	.0	.0	.0	.0	.0	.0	.0	.0
62	.1	.1	.1	.2	.2	.3	.3	.4
64	.2	.3	.3	.4	.4	.6	.6	.7
66	.3	.4	.5	.6	.7	.8	.9	1.0
68	.5	.6	.6	.7	.9	1.1	1.3	1.4
70	.6	.7	.8	.9	1.1	1.4	1.6	1.7
72	.7	.8	.9	1.1	1.3	1.6	1.9	2.1
74	.8	.9	1.1	1.3	1.6	1.8	2.2	2.5
76	.9	1.1	1.3	1.5	1.8	2.1	2.5	2.8
78	1.0	1.2	1.4	1.7	2.0	2.4	2.8	3.1
80	1.1	1.3	1.5	1.8	2.2	2.6	3.1	3.5
82	1.2	1.4	1.7	2.0	2.5	2.9	3.4	3.9
84	1.3	1.5	1.8	2.2	2.7	3.2	3.7	4.3
86	1.4	1.7	2.0	2.4	2.9	3.4	4.0	4.6
88	1.6	1.8	2.1	2.6	3.1	3.7	4.2	4.9
90	1.7	2.0	2.3	2.7	3.3	3.9	4.5	5.2
92	1.8	2.1	2.4	2.9	3.5	4.2	4.8	5.6
94	1.9	2.2	2.6	3.1	3.8	4.4	5.1	5.9
96	2.0	2.3	2.7	3.3	4.0	4.6	5.4	6.3
98	2.1	2.4	2.9	3.4	4.2	4.9	5.7	6.6
100	2.2	2.6	3.0	3.6	4.4	5.1	6.0	6.9
102	2.3	2.7	3.2	3.8	4.6	5.4	6.3	7.2
104	2.4	2.9	3.3	4.0	4.8	5.7	6.6	7.5
106	2.5	3.0	3.5	4.2	5.0	5.9	6.9	7.9
108	2.7	3.1	3.6	4.3	5.2	6.2	7.2	8.2
110	2.8	3.2	3.7	4.4	5.4	6.4	7.5	8.5
112	2.9	3.3	3.9	4.6	5.6	6.7	7.7	8.8
114	3.0	3.4	4.0	4.7	5.8	6.9	7.9	9.1
116	3.1	3.6	4.1	4.9	6.0	7.1	8.2	9.4
118	3.2	3.7	4.3	5.1	6.2	7.3	8.5	9.8
120	3.3	3.8	4.4	5.3	6.4	7.5	8.8	10.1

(This table is calculated from the same data as Table II, Circular No. 57, Bureau of Standards.)

TABLE 17.—Degrees Baumé, Pounds per Gallon, and Gallons per Pound Corresponding to Various Specific Gravities

Specific Gravity 60°/60° F	Degrees Baumé (Modulus 140)	Pounds per Gallon	Gallons per Pound
0.600	103.33	4.993	0.2003
.610	99.51	5.076	.1970
.620	95.81	5.160	.1938
.630	92.22	5.243	.1907
.640	88.75	5.326	.1877
.650	85.38	5.410	.1843
.660	82.12	5.493	.1820
.670	78.96	5.577	.1793
.680	75.88	5.660	.1767
.690	72.90	5.743	.1741
.700	70.00	5.827	.1716
.710	67.18	5.910	.1692
.720	64.44	5.994	.1668
.730	61.78	6.077	.1646
.740	59.19	6.160	.1623
.750	56.67	6.244	.1602
.760	54.21	6.327	.1580
.770	51.82	6.410	.1560
.780	49.49	6.494	.1540
.790	47.22	6.577	.1529
.800	45.00	6.661	.1501
.810	42.84	6.744	.1483
.820	40.73	6.827	.1465
.830	38.68	6.911	.1447
.840	36.67	6.994	.1430
.850	34.71	7.078	.1413
.860	32.79	7.161	.1396
.870	30.92	7.244	.1380
.880	29.09	7.328	.1365
.890	27.30	7.411	.1349
.900	25.56	7.494	.1334
.910	23.85	7.578	.1320
.920	22.17	7.661	.1305
.930	20.54	7.745	.1291
.940	18.94	7.828	.1278
.950	17.37	7.911	.1264
.960	15.83	7.995	.1251
.970	14.33	8.078	.1238
.980	12.86	8.162	.1225
.990	11.41	8.245	.1213
1.000	10.00	8.328	.1201

(See Circular No. 57 for more complete tables.)

TABLE 18.—Specific Gravities, Pounds per Gallon, and Gallons per Pound Corresponding to Various Degrees Baumé

Degrees Baumé (Modulus 140)	Specific Gravity 60°/60° F	Pounds per Gallon	Gallons per Pound	Degrees Baumé (Modulus 140)	Specific Gravity 60°/60° F	Pounds per Gallon	Gallons per Pound
10.0	1.0000	8.328	0.1201	55.0	0.7568	6.300	0.1587
11.0	.9929	8.269	.1209	56.0	.7527	6.266	.1596
12.0	.9859	8.211	.1218	57.0	.7487	6.233	.1604
13.0	.9790	8.153	.1227	58.0	.7447	6.199	.1613
14.0	.9722	8.096	.1235	59.0	.7407	6.166	.1622
15.0	.9655	8.041	.1244	60.0	.7368	6.134	.1630
16.0	.9589	7.986	.1252	61.0	.7330	6.102	.1639
17.0	.9524	7.931	.1261	62.0	.7292	6.070	.1647
18.0	.9459	7.877	.1270	63.0	.7254	6.038	.1656
19.0	.9396	7.825	.1278	64.0	.7216	6.007	.1665
20.0	.9333	7.772	.1287	65.0	.7179	5.976	.1673
21.0	.9272	7.721	.1295	66.0	.7143	5.946	.1682
22.0	.9211	7.670	.1304	67.0	.7107	5.916	.1690
23.0	.9150	7.620	.1313	68.0	.7071	5.886	.1699
24.0	.9091	7.570	.1321	69.0	.7035	5.856	.1708
25.0	.9032	7.522	.1330	70.0	.7000	5.827	.1716
26.0	.8974	7.473	.1338	71.0	.6965	5.798	.1725
27.0	.8917	7.425	.1347	72.0	.6931	5.769	.1733
28.0	.8861	7.378	.1355	73.0	.6897	5.741	.1742
29.0	.8805	7.332	.1364	74.0	.6863	5.712	.1751
30.0	.8750	7.286	.1373	75.0	.6829	5.685	.1759
31.0	.8696	7.241	.1381	76.0	.6796	5.657	.1768
32.0	.8642	7.196	.1390	77.0	.6763	5.629	.1776
33.0	.8589	7.152	.1398	78.0	.6731	5.602	.1785
34.0	.8537	7.108	.1407	79.0	.6699	5.576	.1793
35.0	.8485	7.065	.1415	80.0	.6667	5.549	.1802
36.0	.8434	7.022	.1424	81.0	.6635	5.522	.1811
37.0	.8383	6.980	.1433	82.0	.6604	5.497	.1819
38.0	.8333	6.939	.1441	83.0	.6573	5.471	.1828
39.0	.8284	6.898	.1450	84.0	.6542	5.445	.1837
40.0	.8235	6.857	.1459	85.0	.6512	5.420	.1845
41.0	.8187	6.817	.1467	86.0	.6482	5.395	.1854
42.0	.8140	6.777	.1476	87.0	.6452	5.370	.1862
43.0	.8092	6.738	.1484	88.0	.6422	5.345	.1871
44.0	.8046	6.699	.1493	89.0	.6393	5.320	.1880
45.0	.8000	6.661	.1501	90.0	.6364	5.296	.1888
46.0	.7955	6.623	.1510	91.0	.6335	5.272	.1897
47.0	.7910	6.586	.1518	92.0	.6306	5.248	.1905
48.0	.7865	6.548	.1527	93.0	.6278	5.225	.1914
49.0	.7821	6.511	.1536	94.0	.6250	5.201	.1923
50.0	.7778	6.476	.1544	95.0	.6222	5.178	.1931
51.0	.7735	6.440	.1553	96.0	.6195	5.155	.1940
52.0	.7692	6.404	.1562	97.0	.6167	5.132	.1949
53.0	.7650	6.369	.1570	98.0	.6140	5.110	.1957
54.0	.7609	6.334	.1579	99.0	.6114	5.088	.1966
55.0	.7568	6.300	.1587	100.0	.6087	5.066	.1974

(See Circular No. 57 for more complete tables.)

TABLE 19.—Degrees Baumé Corresponding to Specific Gravities at 60° F ($15^{\circ}56$ C)
for Liquids Heavier than Water

[Calculated from the formula degrees Baumé = $145 - \frac{145}{D_{60^{\circ}F}}$, which defines the Baumé scale, in general use in the United States, for liquids heavier than water]

D $15^{\circ}56$ C $15^{\circ}56$ C	0	1	2	3	4	5	6	7	8	9	Diff.
1.00	0.000	0.145	0.289	0.434	0.578	0.721	0.865	1.008	1.151	1.293	143
1.01	1.436	1.578	1.719	1.861	2.002	2.143	2.283	2.424	2.564	2.704	141
1.02	2.843	2.982	3.121	3.260	3.399	3.537	3.675	3.812	3.950	4.087	138
1.03	4.223	4.360	4.496	4.632	4.768	4.903	5.038	5.174	5.308	5.443	135
1.04	5.577	5.711	5.845	5.978	6.111	6.244	6.377	6.509	6.641	6.773	133
1.05	6.905	7.036	7.167	7.298	7.429	7.559	7.689	7.819	7.949	8.078	130
1.06	8.208	8.336	8.465	8.594	8.722	8.850	8.978	9.105	9.232	9.359	128
1.07	9.486	9.613	9.739	9.865	9.991	10.116	10.242	10.367	10.492	10.616	126
1.08	10.741	10.865	10.989	11.113	11.236	11.359	11.483	11.605	11.728	11.850	124
1.09	11.972	12.094	12.216	12.338	12.459	12.580	12.701	12.821	12.942	13.062	121
1.10	13.182	13.302	13.421	13.540	13.659	13.778	13.897	14.015	14.134	14.252	119
1.11	14.370	14.487	14.604	14.721	14.838	14.955	15.072	15.188	15.304	15.420	117
1.12	15.536	15.651	15.767	15.882	15.997	16.111	16.226	16.340	16.454	16.568	115
1.13	16.682	16.795	16.908	17.021	17.134	17.247	17.359	17.471	17.583	17.695	113
1.14	17.807	17.919	18.030	18.141	18.252	18.363	18.473	18.583	18.693	18.803	111
1.15	18.913	19.023	19.132	19.241	19.350	19.459	19.568	19.676	19.784	19.892	109
1.16	20.000	20.108	20.215	20.322	20.430	20.536	20.643	20.750	20.856	20.962	107
1.17	21.068	21.174	21.280	21.385	21.491	21.596	21.701	21.806	21.910	22.014	105
1.18	22.119	22.223	22.327	22.430	22.534	22.637	22.740	22.843	22.946	23.049	103
1.19	23.151	23.254	23.356	23.458	23.560	23.661	23.763	23.864	23.965	24.066	101
1.20	24.167	24.267	24.368	24.468	24.568	24.668	24.768	24.868	24.967	25.066	100
1.21	25.165	25.264	25.363	25.462	25.560	25.658	25.755	25.855	25.952	26.050	98
1.22	26.148	26.245	26.342	26.439	26.536	26.633	26.729	26.826	26.922	27.018	97
1.23	27.114	27.210	27.305	27.401	27.496	27.591	27.686	27.781	27.876	27.970	95
1.24	28.065	28.159	28.253	28.347	28.441	28.534	28.628	28.721	28.814	28.907	94
1.25	29.000	29.093	29.185	29.278	29.370	29.462	29.554	29.646	29.738	29.829	92
1.26	29.921	30.012	30.103	30.194	30.285	30.376	30.466	30.556	30.647	30.737	91
1.27	30.827	30.917	31.006	31.096	31.185	31.275	31.364	31.453	31.542	31.630	89
1.28	31.719	31.807	31.896	31.984	32.072	32.160	32.247	32.335	32.422	32.510	88
1.29	32.597	32.684	32.771	32.858	32.944	33.031	33.117	33.204	33.290	33.376	87
1.30	33.462	33.547	33.633	33.718	33.804	33.889	33.974	34.059	34.144	34.229	85
1.31	34.313	34.397	34.482	34.566	34.650	34.734	34.818	34.901	34.985	35.068	84
1.32	35.152	35.235	35.318	35.401	35.483	35.566	35.649	35.731	35.813	35.895	83
1.33	35.977	36.059	36.141	36.223	36.304	36.386	36.467	36.548	36.629	36.710	81
1.34	36.791	36.872	36.952	37.033	37.113	37.193	37.273	37.353	37.433	37.513	80
1.35	37.593	37.672	37.751	37.831	37.910	37.989	38.068	38.147	38.225	38.304	79
1.36	38.382	38.461	38.539	38.617	38.695	38.773	38.851	38.928	39.006	39.083	78
1.37	39.161	39.238	39.315	39.392	39.469	39.546	39.622	39.699	39.775	39.851	77
1.38	39.928	40.004	40.080	40.156	40.231	40.307	40.382	40.458	40.533	40.608	76
1.39	40.683	40.758	40.833	40.908	40.983	41.057	41.132	41.206	41.280	41.355	75
1.40	41.429	41.503	41.576	41.650	41.724	41.797	41.871	41.944	42.017	42.090	74
1.41	42.163	42.236	42.309	42.381	42.454	42.527	42.599	42.671	42.743	42.815	73

[Calculated from the formula $\text{degrees Baumé} = \frac{140}{D_{60^\circ}^{\text{F}}} - 130$ which defines the Baumé scale, in general use in the United States, for liquids lighter than water]

D ¹⁵⁹⁵⁶ 15956 C	0	1	2	3	4	5	6	7	8	9	Diff.
.60	103.333	102.945	102.558	102.172	101.788	101.405	101.023	100.642	100.263	99.885	382
.61	99.508	99.133	98.758	98.385	98.013	97.642	97.273	96.904	96.537	96.171	370
.62	95.806	95.442	95.080	94.719	94.359	94.000	93.642	93.285	92.930	92.576	360
.63	92.222	91.870	91.519	91.169	90.820	90.472	90.126	89.780	89.436	89.092	348
.64	88.750	88.409	88.068	87.729	87.391	87.054	86.718	86.383	86.049	85.716	337
.65	85.385	85.054	84.724	84.395	84.067	83.741	83.415	83.090	82.766	82.443	327
.66	82.121	81.800	81.480	81.161	80.843	80.526	80.210	79.895	79.581	79.268	317
.67	78.955	78.644	78.333	78.024	77.715	77.407	77.101	76.795	76.490	76.186	308
.68	75.882	75.580	75.279	74.978	74.678	74.380	74.082	73.785	73.488	73.193	298
.69	72.899	72.605	72.312	72.020	71.729	71.439	71.149	70.861	70.573	70.286	290
.70	70.000	69.715	69.430	69.146	68.864	68.582	68.300	68.020	67.740	67.461	282
.71	67.183	66.906	66.629	66.354	66.078	65.804	65.531	65.258	64.986	64.715	274
.72	64.444	64.175	63.906	63.638	63.370	63.103	62.837	62.572	62.308	62.044	266
.73	61.781	61.518	61.257	60.996	60.736	60.476	60.217	59.959	59.702	59.445	260
.74	59.189	58.934	58.679	58.425	58.172	57.919	57.668	57.416	57.166	56.916	252
.75	56.667	56.418	56.170	55.923	55.676	55.430	55.185	54.941	54.697	54.453	246
.76	54.210	53.968	53.727	53.486	53.246	53.007	52.768	52.529	52.292	52.055	239
.77	51.818	51.582	51.347	51.113	50.879	50.645	50.412	50.180	49.949	49.718	234
.78	49.487	49.257	49.028	48.799	48.571	48.344	48.117	47.891	47.665	47.440	227
.79	47.215	46.991	46.768	46.545	46.322	46.101	45.879	45.659	45.439	45.219	222
.80	45.000	44.781	44.564	44.346	44.129	43.913	43.697	43.482	43.267	43.053	216
.81	42.840	42.626	42.414	42.202	41.990	41.779	41.569	41.359	41.149	40.940	210
.82	40.732	40.524	40.316	40.109	39.903	39.697	39.492	39.287	39.082	38.878	206
.83	38.675	38.472	38.269	38.067	37.866	37.665	37.464	37.264	37.064	36.866	201
.84	36.667	36.469	36.271	36.074	35.877	35.680	35.485	35.289	35.094	34.900	196
.85	34.706	34.512	34.319	34.127	33.934	33.743	33.551	33.361	33.170	32.980	192
.86	32.791	32.602	32.413	32.225	32.037	31.850	31.663	31.476	31.290	31.105	187
.87	30.920	30.735	30.550	30.366	30.183	30.000	29.817	29.635	29.453	29.272	183
.88	29.091	28.910	28.730	28.550	28.371	28.192	28.014	27.835	27.658	27.480	179
.89	27.303	27.127	26.951	26.775	26.600	26.425	26.250	26.076	25.902	25.729	175
.90	25.556	25.383	25.211	25.039	24.867	24.696	24.525	24.355	24.185	24.015	171
.91	23.846	23.677	23.509	23.341	23.173	23.005	22.838	22.672	22.506	22.339	168
.92	22.174	22.009	21.844	21.679	21.515	21.351	21.188	21.025	20.862	20.700	164
.93	20.538	20.376	20.215	20.054	19.893	19.733	19.573	19.413	19.254	19.095	160
.94	18.936	18.778	18.620	18.462	18.305	18.148	17.991	17.835	17.679	17.524	157
.95	17.368	17.214	17.059	16.905	16.751	16.597	16.444	16.290	16.138	15.985	154
.96	15.833	15.682	15.530	15.379	15.228	15.078	14.928	14.778	14.628	14.479	150
.97	14.330	14.181	14.033	13.885	13.737	13.590	13.443	13.297	13.149	13.003	147
.98	12.857	12.712	12.566	12.421	12.276	12.132	11.988	11.844	11.700	11.557	144
.99	11.414	11.271	11.129	10.987	10.845	10.704	10.562	10.421	10.281	10.140	142
1.00	10.000										

TABLE 22.—Specific Gravities at 60° F ($15^{\circ}56$ C) Corresponding to Degrees Baumé for Liquids Lighter than Water[Calculated from the formula, Specific Gravity 60° F = $\frac{140}{130 + \text{Deg. B}^{\circ}}$]

Degrees Baumé	Tenths of Degrees Baumé									
	0	1	2	3	4	5	6	7	8	9
10	1.0000	0.9993	0.9986	0.9979	0.9972	0.9964	0.9957	0.9950	0.9943	0.9936
11	.9929	.9922	.9915	.9908	.9894	.9887	.9880	.9873	.9866	.9859
12	.9859	.9852	.9845	.9838	.9831	.9825	.9818	.9811	.9804	.9797
13	.9790	.9783	.9777	.9770	.9763	.9756	.9749	.9743	.9736	.9729
14	.9722	.9715	.9709	.9702	.9695	.9689	.9682	.9675	.9669	.9662
15	.9655	.9649	.9642	.9635	.9629	.9622	.9615	.9609	.9602	.9596
16	.9589	.9582	.9576	.9569	.9563	.9556	.9550	.9543	.9537	.9530
17	.9524	.9517	.9511	.9504	.9498	.9492	.9485	.9479	.9472	.9466
18	.9459	.9453	.9447	.9440	.9434	.9428	.9421	.9415	.9409	.9402
19	.9396	.9390	.9383	.9377	.9371	.9365	.9358	.9352	.9346	.9340
20	.9333	.9327	.9321	.9315	.9309	.9302	.9296	.9290	.9284	.9278
21	.9272	.9265	.9259	.9253	.9247	.9241	.9235	.9229	.9223	.9217
22	.9211	.9204	.9198	.9192	.9186	.9180	.9174	.9168	.9162	.9156
23	.9150	.9144	.9138	.9132	.9126	.9121	.9115	.9109	.9103	.9097
24	.9091	.9085	.9079	.9073	.9067	.9061	.9056	.9050	.9044	.9038
25	.9032	.9026	.9021	.9015	.9009	.9003	.8997	.8992	.8986	.8980
26	.8974	.8969	.8963	.8957	.8951	.8946	.8940	.8934	.8929	.8923
27	.8917	.8912	.8906	.8900	.8895	.8889	.8883	.8878	.8872	.8866
28	.8861	.8855	.8850	.8844	.8838	.8833	.8827	.8822	.8816	.8811
29	.8805	.8799	.8794	.8788	.8783	.8777	.8772	.8766	.8761	.8755
30	.8750	.8745	.8739	.8734	.8728	.8723	.8717	.8712	.8706	.8701
31	.8696	.8690	.8685	.8679	.8674	.8669	.8663	.8658	.8653	.8647
32	.8642	.8637	.8631	.8626	.8621	.8615	.8610	.8605	.8600	.8594
33	.8589	.8584	.8578	.8573	.8568	.8563	.8557	.8552	.8547	.8542
34	.8537	.8531	.8526	.8521	.8516	.8511	.8505	.8500	.8495	.8490
35	.8485	.8480	.8475	.8469	.8464	.8459	.8454	.8449	.8444	.8439
36	.8434	.8429	.8424	.8419	.8413	.8408	.8403	.8398	.8393	.8388
37	.8383	.8378	.8373	.8368	.8363	.8358	.8353	.8348	.8343	.8338
38	.8333	.8328	.8323	.8318	.8314	.8309	.8304	.8299	.8294	.8289
39	.8284	.8279	.8274	.8269	.8264	.8260	.8255	.8250	.8245	.8240
40	.8235	.8230	.8226	.8221	.8216	.8211	.8206	.8202	.8197	.8192
41	.8187	.8182	.8178	.8173	.8168	.8163	.8159	.8154	.8149	.8144
42	.8140	.8135	.8130	.8125	.8121	.8116	.8111	.8107	.8102	.8097
43	.8092	.8088	.8083	.8078	.8074	.8069	.8065	.8060	.8055	.8051
44	.8046	.8041	.8037	.8032	.8028	.8023	.8018	.8014	.8009	.8005
45	.8000	.7995	.7991	.7986	.7982	.7977	.7973	.7968	.7964	.7959
46	.7955	.7950	.7946	.7941	.7937	.7932	.7928	.7923	.7919	.7914
47	.7910	.7905	.7901	.7896	.7892	.7887	.7883	.7878	.7874	.7870
48	.7865	.7861	.7856	.7852	.7848	.7843	.7839	.7834	.7830	.7826
49	.7821	.7817	.7812	.7808	.7804	.7799	.7795	.7791	.7786	.7782
50	.7778	.7773	.7769	.7765	.7761	.7756	.7752	.7748	.7743	.7739
51	.7735	.7731	.7726	.7722	.7718	.7713	.7709	.7705	.7701	.7697
52	.7692	.7688	.7684	.7680	.7675	.7671	.7667	.7663	.7659	.7654
53	.7650	.7646	.7642	.7638	.7634	.7629	.7625	.7621	.7617	.7613
54	.7609	.7605	.7600	.7596	.7592	.7588	.7584	.7580	.7576	.7572
55	.7568	.7563	.7559	.7555	.7551	.7547	.7543	.7539	.7535	.7531

TABLE 22.—Specific Gravities at $\frac{60^{\circ}}{60^{\circ}}$ F ($\frac{15^{\circ}56}{15^{\circ}56}$ C) Corresponding to Degrees Baumé
for Liquids Lighter than Water—Continued

Degrees Baumé	Tenths of Degrees Baumé									
	0	1	2	3	4	5	6	7	8	9
55	0.7568	0.7563	0.7559	0.7555	0.7551	0.7547	0.7543	0.7539	0.7535	0.7531
56	.7527	.7523	.7519	.7515	.7511	.7507	.7503	.7499	.7495	.7491
57	.7487	.7483	.7479	.7475	.7471	.7467	.7463	.7459	.7455	.7451
58	.7447	.7443	.7439	.7435	.7431	.7427	.7423	.7419	.7415	.7411
59	.7407	.7403	.7400	.7396	.7392	.7388	.7384	.7380	.7376	.7372
60	.7368	.7365	.7361	.7357	.7353	.7349	.7345	.7341	.7338	.7334
61	.7330	.7326	.7322	.7318	.7315	.7311	.7307	.7303	.7299	.7295
62	.7292	.7288	.7284	.7280	.7277	.7273	.7269	.7265	.7261	.7253
63	.7254	.7250	.7246	.7242	.7239	.7235	.7231	.7228	.7224	.7220
64	.7216	.7213	.7209	.7205	.7202	.7198	.7194	.7191	.7187	.7183
65	.7179	.7176	.7172	.7168	.7165	.7161	.7157	.7154	.7150	.7147
66	.7143	.7139	.7136	.7132	.7128	.7125	.7121	.7117	.7114	.7110
67	.7107	.7103	.7099	.7096	.7092	.7089	.7085	.7081	.7078	.7074
68	.7071	.7067	.7064	.7060	.7056	.7053	.7049	.7046	.7042	.7039
69	.7035	.7032	.7028	.7025	.7021	.7018	.7014	.7011	.7007	.7004
70	.7000	.6997	.6993	.6990	.6986	.6983	.6979	.6976	.6972	.6969
71	.6965	.6962	.6958	.6955	.6951	.6948	.6944	.6941	.6938	.6934
72	.6931	.6927	.6924	.6920	.6917	.6914	.6910	.6907	.6903	.6900
73	.6897	.6893	.6890	.6886	.6883	.6880	.6876	.6873	.6869	.6866
74	.6863	.6859	.6856	.6853	.6849	.6846	.6843	.6839	.6836	.6833
75	.6829	.6826	.6823	.6819	.6816	.6813	.6809	.6806	.6803	.6799
76	.6796	.6793	.6790	.6786	.6783	.6780	.6776	.6773	.6770	.6767
77	.6763	.6760	.6757	.6753	.6750	.6747	.6744	.6740	.6737	.6734
78	.6731	.6728	.6724	.6721	.6718	.6715	.6711	.6708	.6705	.6702
79	.6699	.6695	.6692	.6689	.6686	.6683	.6679	.6676	.6673	.6670
80	.6667	.6663	.6660	.6657	.6654	.6651	.6648	.6645	.6641	.6638
81	.6635	.6632	.6629	.6626	.6623	.6619	.6616	.6613	.6610	.6607
82	.6604	.6601	.6598	.6594	.6591	.6588	.6585	.6582	.6579	.6576
83	.6573	.6570	.6567	.6564	.6560	.6557	.6554	.6551	.6548	.6545
84	.6542	.6539	.6536	.6533	.6530	.6527	.6524	.6521	.6518	.6515
85	.6512	.6509	.6506	.6503	.6500	.6497	.6494	.6490	.6487	.6484
86	.6482	.6479	.6476	.6473	.6470	.6467	.6464	.6461	.6458	.6455
87	.6452	.6449	.6446	.6443	.6440	.6437	.6434	.6431	.6428	.6425
88	.6422	.6419	.6416	.6413	.6410	.6407	.6404	.6401	.6399	.6396
89	.6393	.6390	.6387	.6384	.6381	.6378	.6375	.6372	.6369	.6367
90	.6364	.6361	.6358	.6355	.6352	.6349	.6346	.6343	.6341	.6338
91	.6335	.6332	.6329	.6326	.6323	.6321	.6318	.6315	.6312	.6309
92	.6306	.6303	.6301	.6298	.6295	.6292	.6289	.6286	.6284	.6281
93	.6278	.6275	.6272	.6267	.6267	.6264	.6261	.6258	.6256	.6253
94	.6250	.6247	.6244	.6242	.6239	.6236	.6233	.6231	.6228	.6225
95	.6222	.6219	.6217	.6214	.6211	.6208	.6206	.6203	.6200	.6197
96	.6195	.6192	.6189	.6186	.6184	.6181	.6178	.6176	.6173	.6170
97	.6167	.6165	.6162	.6159	.6157	.6154	.6151	.6148	.6146	.6143
98	.6140	.6138	.6135	.6132	.6130	.6127	.6124	.6122	.6119	.6116
99	.6114	.6111	.6108	.6106	.6103	.6100	.6098	.6095	.6092	.6090
100	.6087									

TABLE 23.—Conversion of Density Basis

Prepared for use in reducing readings of a hydrometer graduated to indicate density or specific gravity at a specified standard temperature, T , referred to water at a specified temperature, T' , as unity, to the basis of another standard temperature, t , and reference temperature, t' .

The factor Δ (given in units of the sixth decimal place), multiplied by the density or specific-gravity reading, gives the correction to be applied to the reading to reduce it to the required basis.

Suppose a hydrometer indicates specific gravity at $\frac{20^\circ}{4^\circ}\text{C}$, and it is required to know the correction in order that it shall indicate specific gravity at $\frac{15.56}{15.56}\text{C}$, then,

$$D_{\frac{15.56}{15.56}} = D_{\frac{20}{4}} + \Delta D_{\frac{20}{4}}$$

That is, if the hydrometer indicates correctly a specific gravity of 1.5760 at $\frac{20^\circ}{4^\circ}$, then at $\frac{15.56}{15.56}$ the reading of the instrument will be too low by $1.5760 \times 0.001062 = 0.0017$. A correction of 0.0017 must therefore be added to the indication of the hydrometer.

Or, if a maker using standards indicating $D_{\frac{15.56}{15.56}\text{C}}$ wishes to graduate a hydrometer to indicate density at 20°C referred to water at 4°C ($D_{\frac{20}{4}}$), the readings of the standard must be corrected by use of the factor $+0.001062$.

Suppose the standard reads 1.5760
The corresponding correction is $1.6 \times .001062 = \dots\dots\dots +0.0017$

Corrected reading 1.5777
The table is calculated for Jena 16^{mm} glass.

Given Basis of Density	Required Basis of Density									
	$D_{\frac{25}{4}\text{C}}$	$D_{\frac{20}{4}}$	$D_{\frac{17.5}{4}}$	$D_{\frac{15.56}{4}}$	$D_{\frac{15}{4}}$	$D_{\frac{15}{15}}$	$D_{\frac{15.56}{15.56}}$	$D_{\frac{17.5}{17.5}}$	$D_{\frac{20}{20}}$	$D_{\frac{25}{25}}$
$\frac{T}{T'}$	Δ (In Units of the Sixth Decimal Place)									
$D_{\frac{25}{4}\text{C}}$	0	+ 115	+ 172	+ 217	+ 230	+1104	+1177	+1459	+1884	+2931
$D_{\frac{20}{4}}$	- 115	0	+ 58	+ 102	+ 115	+ 989	+1062	+1345	+1769	+2816
$D_{\frac{17.5}{4}}$	- 172	- 58	0	+ 45	+ 58	+ 932	+1005	+1287	+1711	+2758
$D_{\frac{15.56}{4}}$	- 217	- 102	- 45	0	+ 13	+ 887	+ 960	+1242	+1667	+2713
$D_{\frac{15}{4}}$	- 230	- 115	- 58	- 13	0	+ 874	+ 947	+1229	+1654	+2700
$D_{\frac{15}{15}}$	-1103	- 988	- 931	- 886	- 873	0	+ 73	+ 354	+ 779	+1826
$D_{\frac{15.56}{15.56}}$	-1176	-1061	-1004	- 960	- 947	- 73	0	+ 281	+ 706	+1752
$D_{\frac{17.5}{17.5}}$	-1457	-1343	-1285	-1240	-1227	- 354	- 281	0	+ 424	+1471
$D_{\frac{20}{20}}$	-1881	-1766	-1708	-1664	-1651	- 778	- 705	- 423	0	+1046
$D_{\frac{25}{25}}$	-2923	-2808	-2751	-2707	-2694	-1821	-1748	-1468	-1044	0

TABLE 24.—Weight (in grams), at Various Pressures and Temperatures, of 1 Liter of Dry Air Containing 0.04 Per Cent of CO₂

[Computed from the formula $C = \frac{1.293052}{1+0.00367t} \times \frac{h}{760}$, where h is pressure in mm of mercury at 0° C, and standard gravity, and t is temperature in degrees centigrade]

Temperature in Deg. C	Pressure in mm of Hg (0° C, Standard Gravity)											
	720	725	730	735	740	745	750	755	760	765	770	775
15	1.1611	1.1691	1.1772	1.1853	1.1933	1.2014	1.2095	1.2175	1.2256	1.2336	1.2417	1.2498
16	1.1571	1.1651	1.1731	1.1812	1.1892	1.1972	1.2053	1.2133	1.2213	1.2294	1.2374	1.2454
17	1.1531	1.1611	1.1691	1.1771	1.1851	1.1931	1.2011	1.2091	1.2171	1.2251	1.2331	1.2411
18	1.1491	1.1571	1.1650	1.1730	1.1810	1.1890	1.1970	1.2049	1.2129	1.2209	1.2289	1.2369
19	1.1451	1.1531	1.1611	1.1690	1.1770	1.1849	1.1929	1.2008	1.2088	1.2167	1.2247	1.2326
20	1.1412	1.1492	1.1571	1.1650	1.1729	1.1809	1.1888	1.1967	1.2046	1.2126	1.2205	1.2284
21	1.1373	1.1452	1.1531	1.1610	1.1689	1.1768	1.1847	1.1926	1.2005	1.2084	1.2163	1.2242
22	1.1335	1.1414	1.1492	1.1571	1.1650	1.1728	1.1807	1.1886	1.1965	1.2043	1.2122	1.2201
23	1.1296	1.1375	1.1453	1.1532	1.1610	1.1689	1.1767	1.1846	1.1924	1.2002	1.2081	1.2159
24	1.1258	1.1337	1.1415	1.1493	1.1571	1.1649	1.1727	1.1806	1.1884	1.1962	1.2040	1.2118
25	1.1220	1.1298	1.1376	1.1454	1.1532	1.1610	1.1688	1.1766	1.1844	1.1922	1.2000	1.2078
26	1.1183	1.1261	1.1338	1.1416	1.1494	1.1571	1.1649	1.1727	1.1804	1.1882	1.1959	1.2037
27	1.1146	1.1223	1.1300	1.1378	1.1455	1.1533	1.1610	1.1687	1.1765	1.1842	1.1920	1.1997
28	1.1108	1.1186	1.1263	1.1340	1.1417	1.1494	1.1571	1.1648	1.1726	1.1803	1.1880	1.1957
29	1.1072	1.1149	1.1225	1.1302	1.1379	1.1456	1.1533	1.1610	1.1687	1.1764	1.1840	1.1917
30	1.1035	1.1112	1.1188	1.1265	1.1342	1.1418	1.1495	1.1571	1.1648	1.1725	1.1801	1.1878
31	1.0999	1.1075	1.1151	1.1228	1.1304	1.1381	1.1457	1.1533	1.1610	1.1686	1.1762	1.1839

TABLE 25.—Buoyancy Constants (mg/ml)

[Difference in milligrams between the mass and the apparent weight of 1 milliliter of water weighed with brass weights ($d=8.4$) in air at various temperatures and barometer readings (unreduced). A humidity of 50 per cent saturation is assumed. To find the weight of 1 milliliter of air under the conditions assumed in this table, multiply the buoyancy constant by 1.135 (42/37)]

Pressure		Temperature in Degrees Centigrade			
		15	20	25	30
Observed Pressure in Millimeters.	640	0.904	0.886	0.869	0.852
	650	0.918	0.900	0.883	0.866
	660	0.932	0.914	0.897	0.879
	670	0.946	0.928	0.911	0.893
	680	0.960	0.942	0.924	0.906
	690	0.975	0.956	0.938	0.920
	700	0.989	0.970	0.952	0.933
	705	0.996	0.977	0.958	0.940
	710	1.003	0.984	0.965	0.947
	715	1.010	0.991	0.972	0.953
	720	1.017	0.998	0.979	0.960
	725	1.024	1.004	0.985	0.967
	730	1.031	1.011	0.992	0.973
	735	1.038	1.018	0.999	0.980
	740	1.045	1.025	1.006	0.987
	745	1.052	1.032	1.013	0.994
	750	1.059	1.039	1.020	1.000
	755	1.067	1.046	1.027	1.007
	760	1.074	1.053	1.034	1.014
	765	1.081	1.060	1.040	1.020
	770	1.088	1.067	1.047	1.027
	775	1.095	1.074	1.054	1.034
	780	1.102	1.081	1.061	1.041

TABLE 26.—Density (in grams per milliliter) of Water at Temperatures from 0° to 102° C¹

Temp., Deg. C	Density	Temp., Deg. C	Density	Temp., Deg. C	Density
0	0.99987	35	0.99406	70	0.97781
1	.99993	36	.99371	71	.97723
2	.99997	37	.99336	72	.97666
3	.99999	38	.99299	73	.97607
4	1.00000	39	.99262	74	.97548
5	.99999	40	.99224	75	.97489
6	.99997	41	.99186	76	.97428
7	.99993	42	.99147	77	.97368
8	.99988	43	.99107	78	.97307
9	.99981	44	.99066	79	.97245
10	.99973	45	.99024	80	.97183
11	.99963	46	.98982	81	.97120
12	.99952	47	.98940	82	.97057
13	.99940	48	.98896	83	.96994
14	.99927	49	.98852	84	.96930
15	.99913	50	.98807	85	.96865
16	.99897	51	.98762	86	.96800
17	.99880	52	.98715	87	.96734
18	.99862	53	.98669	88	.96668
19	.99843	54	.98621	89	.96601
20	.99823	55	.98573	90	.96534
21	.99802	56	.98524	91	.96467
22	.99780	57	.98478	92	.96399
23	.99756	58	.98425	93	.96330
24	.99732	59	.98375	94	.96261
25	.99707	60	.98324	95	.96192
26	.99681	61	.98272	96	.96122
27	.99654	62	.98220	97	.96051
28	.99626	63	.98167	98	.95981
29	.99597	64	.98113	99	.95909
30	.99567	65	.98059	100	.95838
31	.99537	66	.98005	101	.95765
32	.99505	67	.97950	102	.95693
33	.99473	68	.97894		
34	.99440	69	.97838		
35	.99406	70	.97781		

¹ According to M. Thiesen, *Wiss. Abh. der Physikalisch-Technischen Reichsanstalt*, 4, No. 1; 1904.

TABLE 27.—Density of Pure Water Free from Air

[Under standard pressure (76 cm), at every tenth part of a degree of the international hydrogen scale from 0° to 41° C., in grams per milliliter ⁶]

De- grees Centi- grade	Tenths of Degrees										Mean Differ- ences
	0	1	2	3	4	5	6	7	8	9	
0	0.999 8681	8747	8812	8875	8936	8996	9053	9109	9163	9216	+ 59
1		9267	9315	9363	9408	9452	9494	9573	9610	9645	+ 41
2		9679	9711	9741	9769	9796	9821	9844	9866	9887	+ 24
3		9922	9937	9951	9962	9973	9981	9988	9994	9998	+ 8
4	1.000 0000	*9999	*9996	*9992	*9986	*9979	*9970	*9960	*9947	*9934	— 8
5	0.999 9919	9902	9884	9864	9842	9819	9795	9769	9742	9713	— 24
6		9682	9650	9617	9582	9545	9507	9468	9427	9385	— 39
7		9296	9249	9201	9151	9100	9048	8994	8938	8881	— 53
8		8764	8703	8641	8577	8512	8445	8377	8308	8237	— 67
9		8091	8017	7940	7863	7784	7704	7622	7539	7455	— 81
10	7282	7194	7105	7014	6921	6826	6729	6632	6533	6432	— 95
11	6331	6228	6124	6020	5913	5805	5696	5586	5474	5362	—108
12	5248	5132	5016	4898	4780	4660	4538	4415	4291	4166	—121
13	4040	3912	3784	3654	3523	3391	3257	3122	2986	2850	—133
14	2712	2572	2431	2289	2147	2003	1858	1711	1564	1416	—145
15	1266	1114	0962	0809	0655	0499	0343	0185	0026	*9865	—156
16	0.998 9705	9542	9378	9214	9048	8881	8713	8544	8373	8202	—168
17		8029	7856	7681	7505	7328	7150	6971	6791	6610	—178
18		6244	6058	5873	5686	5498	5309	5119	4927	4735	—190
19		4347	4152	3955	3757	3558	3358	3158	2955	2752	—200
20	2343	2137	1930	1722	1511	1301	1090	0878	0663	0449	—211
21	0233	0016	*9799	*9580	*9359	*9139	*8917	*8694	*8470	*8245	—221
22	0.997 8019	7792	7564	7335	7104	6873	6641	6408	6173	5938	—232
23		5702	5466	5227	4988	4747	4506	4264	4021	3777	—242
24		3286	3039	2790	2541	2291	2040	1788	1535	1280	—252
25	0770	0513	0255	*9997	*9736	*9476	*9214	*8951	*8688	*8423	—261
26	0.996 8158	7892	7624	7356	7087	6817	6545	6273	6000	5726	—271
27		5451	5176	4898	4620	4342	4062	3782	3500	3218	—280
28		2652	2366	2080	1793	1505	1217	0928	0637	0346	—289
29	0.995 9761	9466	9171	8876	8579	8282	7983	7684	7383	7083	—298
30	6780	6478	6174	5869	5564	5258	4950	4642	4334	4024	—307
31	3714	3401	3089	2776	2462	2147	1832	1515	1198	0880	—315
32	0561	0241	*9920	*9599	*9276	*8954	*8630	*8304	*7979	*7653	—324
33	0.994 7325	6997	6668	6338	6007	5676	5345	5011	4678	4343	—332
34		4007	3671	3335	2997	2659	2318	1978	1638	1296	—340
35	0610	0267	*9922	*9576	*9230	*8883	*8534	*8186	*7837	*7486	—347
36	0.993 7136	6784	6432	6078	5725	5369	5014	4658	4301	3943	—355
37		3585	3226	2866	2505	2144	1782	1419	1055	0691	—362
38	0.992 9960	9593	9227	8859	8490	8120	7751	7380	7008	6636	—370
39		6263	5890	5516	5140	4765	4389	4011	3634	3255	—377
40	2497	2116	1734	1352	0971	0587	0203	*9818	*9433	*9047	—384
41	0.991 8661										

⁶ According to P. Chappuis, Bureau international des Poids et Mesures, Travaux et Mémoires, XIII; 1907.

TABLE 28.—Weight of 1 Gallon of Water

[This table is based on the water densities of P. Chappuis (Bureau International des Poids et Mesures, Travaux et Mémoires, XIII; 1907) for 0° to 40° C, and of M. Thiesen (Wiss. Abh. der Physikalisch-Technischen Reichsanstalt, 4, No. 1; 1904) for 41° to 100° C. The weights in air are for dry air at the same temperature as the water up to 40° C and at a (corrected) barometric pressure of 760 mm and against brass weights of 8.4 density at 0° C. Above 40° C the temperature of the air is assumed to be 20° C, i. e., the water is allowed to cool to 20° C before the weighings are made. The volumetric computations are based on the relation that 1 liter=1.000027 cubic decimeters and 1 cubic decimeter=61.023378 cubic inches. The weights corresponding to 15½° C (60° F) and 16⅓° C (62° F) have been included in the table because of the frequent use of these temperatures in engineering and industrial work.]

Temperature, °C	Weight in Vacuo		Weight in Air	
	Grams	Pounds	Grams	Pounds
0	3784.833	8.34412	3780.520	8.33461
1	5.055	.34461	0.758	.33613
2	5.211	.34495	0.930	.33551
3	5.303	.34515	1.037	.33575
4	5.332	.34522	1.082	.33585
5	5.302	.34515	1.067	.33582
6	5.212	.34495	0.992	.33565
7	5.066	.34463	0.861	.33536
8	4.864	.34419	0.675	.33495
9	4.610	.34363	0.435	.33442
10	4.303	.34295	0.144	.33378
11	3.943	.34216	3779.798	.33302
12	3.534	.34125	9.403	.33215
13	3.076	.34025	8.960	.33117
14	2.574	.33914	8.472	.33009
15	2.026	.33793	7.939	.32892
(15½) 60° F	(3781.703)	(8.33722)	(3777.623)	(8.32823)
16	1.435	.33663	7.362	.32765
(16⅓) 62° F	(3781.017)	(8.33571)	(3776.953)	(8.32675)
17	0.801	.33523	6.741	.32628
18	0.125	.33374	6.080	.32482
19	3779.407	.33216	5.375	.32327
20	8.649	.33049	4.630	.32162
21	7.850	.32872	3.845	.31989
22	7.012	.32688	3.021	.31808
23	6.135	.32494	2.157	.31617
24	5.220	.32293	1.256	.31419
25	4.268	.32083	0.317	.31212
26	3.279	.31865	3769.341	.30996
27	2.254	.31639	8.329	.30773
28	1.195	.31405	7.283	.30543
29	0.100	.31164	6.201	.30304
30	3768.972	.30915	5.086	.30058
31	7.812	.30659	3.938	.29805
32	6.618	.30396	2.757	.29545
33	5.393	.30126	1.545	.29278
34	4.137	.29849	0.301	.29003
35	2.851	.29566	3759.027	.28723
36	1.536	.29276	7.725	.28436
37	0.192	.28979	6.393	.28142
38	3758.820	.28677	5.033	.27842
39	7.420	.28368	3.645	.27536
40	5.995	.28054	2.232	.27225
41	4.52	.2773	0.53	.2685
42	3.04	.2740	3749.05	.2652
43	1.53	.2707	7.54	.2619
44	3749.98	.2673	5.99	.2585

TABLE 28.—Weight of 1 Gallon of Water—Continued

Temperature, °C	Weight in Vacuo		Weight in Air	
	Grams	Pounds	Grams	Pounds
45	3748.39	8.2638	3744.40	8.2550
46	6.80	.2603	2.81	.2515
47	5.21	.2568	1.23	.2480
48	3.54	.2531	3739.56	.2443
49	1.88	.2494	7.90	.2407
50	0.17	.2457	6.20	.2369
51	3738.47	.2419	4.50	.2332
52	6.69	.2380	2.72	.2292
53	4.95	.2341	0.98	.2254
54	3.13	.2301	3729.16	.2214
55	1.32	.2261	7.35	.2174
56	3729.46	.2220	5.50	.2133
57	7.72	.2182	3.76	.2095
58	5.71	.2138	1.75	.2051
59	3.82	.2096	3719.86	.2009
60	1.89	.2054	7.93	.1966
61	3719.92	.2010	5.97	.1923
62	7.95	.1967	4.00	.1880
63	5.95	.1923	2.00	.1835
64	3.90	.1877	3709.95	.1790
65	1.86	.1832	7.91	.1745
66	3709.82	.1787	5.87	.1700
67	7.73	.1741	3.79	.1655
68	5.61	.1695	1.67	.1608
69	3.49	.1648	3699.56	.1561
70	1.33	.1600	7.40	.1514
71	3699.14	.1552	5.21	.1465
72	6.98	.1504	3.05	.1418
73	4.75	.1455	0.82	.1369
74	2.52	.1406	3688.59	.1319
75	0.28	.1357	6.36	.1270
76	3687.97	.1306	4.05	.1219
77	5.70	.1256	1.78	.1169
78	3.39	.1205	3679.48	.1119
79	1.05	.1153	7.13	.1067
80	3678.70	.1101	4.79	.1015
81	6.32	.1049	2.41	.0963
82	3.93	.0996	0.02	.0910
83	1.54	.0944	3667.64	.0858
84	3669.12	.0890	5.22	.0804
85	6.66	.0836	2.76	.0750
86	4.20	.0782	0.31	.0696
87	1.70	.0727	3657.81	.0641
88	3659.21	.0672	5.31	.0586
89	6.67	.0616	2.78	.0530
90	4.13	.0560	0.25	.0474
91	1.60	.0504	3647.71	.0418
92	3649.02	.0447	5.14	.0362
93	6.41	.0390	2.53	.0304
94	3.80	.0332	3639.92	.0247
95	1.19	.0274	7.32	.0189
96	3638.54	.0216	4.67	.0131
97	5.85	.0157	1.98	.0072
98	3.20	.0098	3629.34	.0013
99	0.47	.0038	6.61	7.9953
100	3627.79	7.9979	3.93	.9894

TABLE 29.—Weight of 1 Cubic Foot of Water

[This table is based on the water densities of P. Chappuis (Bureau International des Poids et Mesures, Travaux et Mémoires, XIII; 1907) for 0° to 40° C, and of M. Thiesen (Wis. Abh. der Physikalisch-Technischen Reichsanstalt, 4, No. 1; 1904) for 41° to 100° C. The weights in air are for dry air at the same temperature as the water up to 40° C and at a (corrected) barometric pressure of 760 mm and against brass weights of 8.4 density at 0° C. Above 40° C the temperature of the air is assumed to be 20° C, i. e., the water is allowed to cool to 20° C before the weighings are made. The volumetric computations are based on the relation that 1 liter=1.000027 cubic decimeters and 1 cubic decimeter=61.023378 cubic inches. The weights corresponding to 15½° C (60° F) and 16½° C (62° F) have been included in the table because of the frequent use of these temperatures in engineering and industrial work.]

Temperature, °C	Weight in Vacuo		Weight in Air	
	Grams	Pounds	Grams	Pounds
0	28312.517	62.4183	28280.254	62.3472
1	14.178	.4220	82.033	.3511
2	15.345	.4246	83.321	.3540
3	16.033	.4261	84.121	.3557
4	16.250	.4266	84.458	.3565
5	16.025	.4261	84.345	.3562
6	15.352	.4246	83.784	.3550
7	14.260	.4222	82.804	.3528
8	12.749	.4189	81.413	.3498
9	10.849	.4147	79.618	.3458
10	08.552	.4096	77.441	.3410
11	05.859	.4037	74.853	.3353
12	02.800	.3969	71.898	.3288
13	28299.374	.3894	68.584	.3215
14	95.619	.3811	64.933	.3134
15	91.519	.3720	60.946	.3046
(15½) 60° F	(28289.103)	(62.3667)	(28258.58)	(62.2994)
16	87.098	.3623	56.630	.2951
(16½) 62° F	(28283.971)	(62.3554)	(28253.57)	(62.2884)
17	82.356	.3518	51.985	.2849
18	77.299	.3407	47.040	.2740
19	71.928	.3289	41.766	.2624
20	66.258	.3164	36.193	.2501
21	60.281	.3032	30.321	.2371
22	54.012	.2894	24.157	.2235
23	47.452	.2749	17.694	.2093
24	40.607	.2598	10.954	.1944
25	33.485	.2441	03.930	.1789
26	26.087	.2278	28196.629	.1629
27	18.420	.2109	89.059	.1462
28	10.500	.1934	81.234	.1289
29	02.307	.1754	73.140	.1111
30	28193.869	.1568	64.799	.0927
31	85.191	.1376	56.212	.0737
32	76.259	.1179	47.377	.0543
33	67.096	.0977	38.311	.0343
34	57.700	.0770	29.005	.0138
35	48.080	.0558	19.475	61.9926
36	38.243	.0341	09.735	.9713
37	28.190	.0120	28099.771	.9493
38	17.926	61.9893	89.596	.9269
39	07.454	.9663	79.215	.9040
40	28096.794	.9428	68.645	.8807
41	85.76	.918	55.90	.853
42	74.71	.894	44.86	.828
43	63.39	.869	33.55	.803
44	51.78	.844	21.94	.778

TABLE 29.—Weight of 1 Cubic Foot of Water—Continued

Temperature, °C	Weight in Vacuo		Weight in Air	
	Grams	Pounds	Grams	Pounds
45	28039.83	61.817	28010.05	61.752
46	28.00	.791	27998.19	.725
47	16.10	.765	86.31	.699
48	03.64	.737	73.86	.672
49	27991.18	.710	61.42	.644
50	78.44	.682	48.69	.616
51	65.70	.654	35.96	.588
52	52.39	.624	22.67	.559
53	39.37	.596	09.65	.530
54	25.77	.566	27896.08	.500
55	12.18	.536	82.50	.470
56	27898.31	.505	68.64	.440
57	85.28	.476	55.63	.411
58	70.27	.443	40.63	.378
59	56.12	.412	26.49	.347
60	41.67	.380	12.06	.315
61	26.95	.348	27797.36	.283
62	12.22	.315	82.65	.250
63	27797.21	.282	67.66	.217
64	81.92	.249	52.38	.184
65	66.63	.215	37.11	.150
66	51.34	.181	21.83	.116
67	35.77	.147	06.27	.082
68	19.91	.112	27690.44	.047
69	04.05	.077	74.59	.012
70	27687.92	.041	58.47	60.976
71	71.49	.005	42.07	.940
72	55.35	60.970	25.95	.905
73	38.64	.933	09.25	.868
74	21.94	.896	27592.57	.831
75	05.23	.859	75.88	.794
76	27587.96	.821	58.62	.756
77	70.97	.784	41.65	.719
78	53.69	.745	24.39	.681
79	36.14	.707	06.86	.642
80	18.58	.668	27489.32	.604
81	00.75	.629	71.50	.564
82	27482.90	.589	53.68	.525
83	65.06	.550	35.86	.486
84	46.95	.510	17.76	.446
85	28.54	.470	27399.37	.405
86	10.13	.429	80.99	.365
87	27391.44	.388	62.31	.324
88	72.75	.347	43.65	.282
89	53.78	.305	24.70	.241
90	34.81	.263	05.74	.199
91	15.84	.221	27286.80	.157
92	27296.58	.179	67.56	.115
93	77.05	.136	48.05	.072
94	57.51	.093	28.52	.029
95	37.97	.049	09.01	59.986
96	18.15	.006	27189.20	.942
97	27198.05	59.961	69.13	.898
98	78.22	.918	49.33	.854
99	57.83	.873	28.96	.809
100	37.73	.828	08.87	.765

TABLE 30.—Apparent Weight (in grams) of Water in Air

[This table gives the apparent weight, for temperatures between 15° and 30° C, humidity 50 per cent, unreduced barometer reading 76 cm of certain volumes of water weighed with brass weights. This table is based on the data given in Tables 25 and 27, and may be conveniently employed to determine definite volumes of water for calibrating instruments. The table assumes the air to be at the same temperature as the water]

Temp. in Degrees C	2000 ml	1000 ml	500 ml	400 ml	300 ml	250 ml	150 ml
15	1996.11	998.05	499.03	399.22	299.42	249.51	149.71
16	1995.80	997.90	498.95	399.16	299.37	249.48	149.68
17	1995.48	997.74	498.87	399.10	299.32	249.43	149.66
18	1995.13	997.56	498.78	399.03	299.27	249.39	149.63
19	1994.76	997.38	498.69	398.95	299.21	249.34	149.61
20	1994.36	997.18	498.59	398.87	299.15	249.30	149.58
21	1993.95	996.97	498.49	398.79	299.09	249.24	149.55
22	1993.51	996.76	498.38	398.70	299.03	249.19	149.51
23	1993.06	996.53	498.26	398.61	298.96	249.13	149.48
24	1992.58	996.29	498.15	398.52	298.89	249.07	149.44
25	1992.09	996.04	498.02	398.42	298.81	249.01	149.41
26	1991.57	995.79	497.89	398.31	298.74	248.95	149.37
27	1991.04	995.52	497.76	398.21	298.66	248.88	149.33
28	1990.49	995.24	497.62	398.10	298.57	248.81	149.29
29	1989.92	994.96	497.48	397.98	298.49	248.74	149.24
30	1989.33	994.66	497.33	397.87	298.40	248.67	149.20

TABLE 31.—Temperature Correction for Glass Volumetric Apparatus

[This table gives the correction to be added to actual capacity (determined at certain temperatures) to give the capacity at the standard temperature, 20° C. Conversely, by subtracting the corrections from the indicated capacity of an instrument standard at 20° C the corresponding capacity at other temperatures is obtained. The table assumes for the cubical coefficient of expansion of glass 0.000025 per degree centigrade. The coefficients of expansion of glasses used for volumetric instruments vary from 0.000023 to 0.000028]

Temp. in Degrees C	2000 ml	1000 ml	500 ml	400 ml	300 ml	250 ml
15	+0.25	+0.12	+0.06	+0.05	+0.04	+0.031
16	+ .20	+ .10	+ .05	+ .04	+ .03	+ .025
17	+ .15	+ .08	+ .04	+ .03	+ .02	+ .019
18	+ .10	+ .05	+ .02	+ .02	+ .02	+ .012
19	+ .05	+ .02	+ .01	+ .01	+ .01	+ .006
21	-0.05	-0.02	-0.01	-0.01	-0.01	-0.006
22	- .10	- .05	- .02	- .02	- .02	- .012
23	- .15	- .08	- .04	- .03	- .02	- .019
24	- .20	- .10	- .05	- .04	- .03	- .025
25	- .25	- .12	- .06	- .05	- .04	- .031
26	-0.30	-0.15	-0.08	-0.06	-0.04	-0.038
27	- .35	- .18	- .09	- .07	- .05	- .044
28	- .40	- .20	- .10	- .08	- .06	- .050
29	- .45	- .22	- .11	- .09	- .07	- .056
30	- .50	- .25	- .12	- .10	- .08	- .062

TABLE 32.—Apparent Weight (in Grams) of Water in Air

[This table gives the apparent weight of certain volumes of water weighed against brass weights in air, humidity 50 per cent, barometer reading 76 cm (unreduced), weighings being made at 20° C, the water and air being at the same temperature. It differs from Table 30 only in its greater temperature range and in the fact that the water is allowed to come to a temperature of 20° C before the weighings are made. The weighings may be made at any temperature between 18° and 22° without introducing errors greater than 1 mg per 100 cc.]

Temp. in De- grees C	2000 ml	1000 ml	500 ml	400 ml	300 ml	250 ml	150 ml
15	1996.14	998.07	499.04	399.23	299.42	249.52	149.71
16	1995.83	997.92	498.96	399.17	299.38	249.48	149.69
17	1995.50	997.75	498.87	399.10	299.32	249.44	149.66
18	1995.14	997.57	498.79	399.03	299.27	249.39	149.64
19	1994.76	997.38	498.69	398.95	299.21	249.35	149.61
20	1994.36	997.18	498.59	398.87	299.15	249.30	149.58
21	1993.94	996.97	498.49	398.79	299.09	249.24	149.55
22	1993.50	996.75	498.37	398.70	299.02	249.19	149.51
23	1993.04	996.52	498.26	398.61	298.96	249.13	149.48
24	1992.55	996.28	498.14	398.51	298.88	249.07	149.44
25	1992.05	996.03	498.01	398.41	298.81	249.01	149.40
26	1991.53	995.76	497.88	398.31	298.73	248.94	149.36
27	1990.99	995.49	497.75	398.20	298.65	248.87	149.32
28	1990.43	995.21	497.61	398.09	298.56	248.80	149.28
29	1989.85	994.93	497.46	397.97	298.48	248.73	149.24
30	1989.26	994.63	497.31	397.85	298.39	248.66	149.19
35	1986.02	993.01	496.51	397.20	297.90	248.25	148.95
40	1982.41	991.20	495.60	396.48	297.36	247.80	148.68
45	1978.4	989.2	494.6	395.7	296.8	247.3	148.4
50	1974.1	987.0	493.5	394.8	296.1	246.8	148.1
55	1969.4	984.7	492.3	393.9	295.4	246.2	147.7
60	1964.4	982.2	491.1	392.9	294.7	245.6	147.3
65	1959.1	979.6	489.8	391.8	293.9	244.9	146.9
70	1953.6	975.8	488.4	390.7	293.0	244.2	146.5
75	1947.7	973.9	486.9	389.5	292.2	243.5	146.1
80	1941.6	970.8	485.4	388.3	291.2	242.7	145.6
85	1935.3	967.6	483.8	387.1	290.3	241.9	145.1
90	1928.6	964.3	482.2	385.7	289.3	241.1	144.6
95	1921.8	960.9	480.5	384.4	288.3	240.2	144.1
100	1914.7	957.4	478.7	382.9	287.2	239.3	143.6

TABLE 33.—Temperature Correction for Volumetric Solutions

[This table gives the correction to various observed volumes of water, measured at the designated temperatures, to give the volume at the standard temperature, 20° C. Conversely, by subtracting the corrections from the volume desired at 20° C, the volume that must be measured out at the designated temperatures in order to give the desired volume at 20° C, will be obtained. It is assumed that the volumes are measured in glass apparatus having a coefficient of cubical expansion of 0.000025 per degree centigrade. The table is applicable to dilute aqueous solutions having the same coefficient of expansion as water]

Temp. of measurement, °C	Capacity of apparatus in milliliters at 20° C						
	2000	1000	500	400	300	250	150
	Correction in milliliters to give volume of water at 20° C						
15	+1.54	+0.77	+0.38	+0.31	+0.23	+0.19	+0.12
16	+1.28	+0.64	+0.32	+0.26	+0.19	+0.16	+0.10
17	+0.99	+0.50	+0.25	+0.20	+0.15	+0.12	+0.07
18	+0.68	+0.34	+0.17	+0.14	+0.10	+0.08	+0.05
19	+0.35	+0.18	+0.09	+0.07	+0.05	+0.04	+0.03
21	-0.37	-0.18	-0.09	-0.07	-0.06	-0.05	-0.03
22	-0.77	-0.38	-0.19	-0.15	-0.12	-0.10	-0.06
23	-1.18	-0.59	-0.30	-0.24	-0.18	-0.15	-0.09
24	-1.61	-0.81	-0.40	-0.32	-0.24	-0.20	-0.12
25	-2.07	-1.03	-0.52	-0.41	-0.31	-0.26	-0.15
26	-2.54	-1.27	-0.64	-0.51	-0.38	-0.32	-0.19
27	-3.03	-1.52	-0.76	-0.61	-0.46	-0.38	-0.23
28	-3.55	-1.77	-0.89	-0.71	-0.53	-0.44	-0.27
29	-4.08	-2.04	-1.02	-0.82	-0.61	-0.51	-0.31
30	-4.62	-2.31	-1.16	-0.92	-0.69	-0.58	-0.35

In using the above table to correct the volume of certain standard solutions to 20° C more accurate results will be obtained if the numerical values of the corrections are increased by the percentages given below:

Solution	Normality		
	N	N/2	N/10
HNO ₃	50	25	6
H ₂ SO ₄	45	25	5
NaOH.....	40	25	5
KOH.....	40	20	4

The weight of a body in vacuo is determined by adding to its apparent weight in air a buoyancy correction equal to the weight of the air displaced by the difference in volume of the body weighed and the weights required to balance it on an equal arm balance.

$$M = W + \rho \left(\frac{M}{d_1} - \frac{W}{d_2} \right) = W \frac{d_1}{d_2} \left(\frac{d_2 - \rho}{d_1 - \rho} \right) = W \frac{d_1}{d_1 - \rho} \left(1 - \frac{\rho}{d_2} \right) =$$

$$W \left[1 + \frac{\rho}{d_2} \left(\frac{d_2 - d_1}{d_1 - \rho} \right) \right] = W + kW/1000$$

M = weight in vacuo; W = apparent weight in air; ρ = density of air; d_1 = density of body; d_2 = density of weights.

The following table has been computed for $\rho = 0.0012$:

TABLE 34.—Reduction of Weighings to Vacuo

Density of Body Weighed, g/cm ³	Correction Factor, k			Density of Body Weighed, g/cm ³	Correction Factor, k		
	Pt. Ir. Weights d=21.5g/cm ³	Brass Weights 8.4	Quartz or Al. Wts. 2.65		Pt. Ir. Weights d=21.5g/cm ³	Brass Weights 8.4	Quartz or Al. Wts. 2.65
0.5	+2.35	+2.26	+1.95	5.0	+0.18	+0.10	-0.21
.6	+1.95	+1.86	+1.55	6.0	+ .15	+ .06	- .25
.7	+1.66	+1.57	+1.26	7.0	+ .12	+ .03	- .28
.8	+1.45	+1.35	+1.05	8.0	+ .10	+ .01	- .30
.9	+1.28	+1.19	+ .88	9.0	+ .08	- .01	- .32
1.0	+1.14	+1.06	+ .75	10.0	+ .06	- .02	- .33
1.1	+1.04	+ .95	+ .64	11.0	+ .05	- .03	- .34
1.2	+ .94	+ .86	+ .55	12.0	+ .04	- .04	- .35
1.3	+ .87	+ .78	+ .47	13.0	+ .04	- .05	- .36
1.4	+ .80	+ .72	+ .40	14.0	+ .03	- .06	- .37
1.5	+ .74	+ .66	+ .35	15.0	+ .02	- .06	- .37
1.6	+ .69	+ .61	+ .30	16.0	+ .02	- .07	- .38
1.7	+ .65	+ .56	+ .25	17.0	+ .01	- .07	- .38
1.8	+ .61	+ .52	+ .21	18.0	+ .01	- .08	- .39
1.9	+ .58	+ .49	+ .18	19.0	+ .01	- .08	- .39
2.0	+ .54	+ .46	+ .15	20.0	.00	- .08	- .39
2.5	+ .42	+ .34	+ .03	21.0	.00	- .09	- .40
3.0	+ .34	+ .26	- .05	22.0	.00	- .09	- .40
3.5	+ .29	+ .20	- .11	23.0	.00	- .09	- .40
4.0	+ .24	+ .16	- .15	24.0	- .01	- .09	- .40

TABLES OF CORRECTIONS FOR DETERMINING THE TRUE CAPACITIES OF GLASS VESSELS FROM THE WEIGHT OF WATER IN AIR

Tables 35 to 47 are intended for the calculation of capacities of glass vessels of common sizes from the weight (in air) of the water contained or delivered. They give for each nominal capacity and observed temperature the amounts to be added to the apparent weight (in air against brass weights) of the water contained in or delivered by a glass vessel to give the capacity in milliliters at 20° C. They are calculated on the following data assumed as approximating ordinary conditions:

Observed barometric pressure..... 76 cm
 Relative humidity..... 50 per cent
 Coefficient of expansion of glass..... 0.000025 per deg. C

EXAMPLE OF USE OF TABLE.

Determination of capacity of glass measuring flask marked "To contain 250 ml at 20° C."

Apparent weight of water at the observed temperature 22°3 C..... 249.198g
 From Table 35, correction..... 0.813

Actual capacity at 20°..... 250.011 ml

TABLE 35.—Indicated Capacity 250 ml

[Amounts to be added to apparent weight of water in grams to obtain actual capacity in milliliters at 20° C]

Temp. in Deg. C	Tenths of Degrees									
	0	1	2	3	4	5	6	7	8	9
15	0.518	0.521	0.524	0.528	0.530	0.534	0.537	0.540	0.543	0.546
16	.550	.554	.556	.560	.563	.567	.570	.574	.578	.581
17	.584	.588	.592	.596	.599	.603	.606	.610	.614	.618
18	.622	.626	.630	.633	.638	.642	.646	.649	.654	.658
19	.662	.666	.670	.674	.679	.683	.687	.692	.696	.700
20	.705	.709	.714	.718	.722	.727	.732	.736	.741	.746
21	.750	.754	.760	.764	.769	.774	.778	.784	.788	.793
22	.798	.804	.808	.813	.818	.824	.828	.834	.839	.844
23	.849	.854	.860	.865	.870	.875	.881	.886	.892	.897
24	.902	.908	.913	.919	.924	.930	.936	.941	.947	.952
25	.958	.964	.969	.975	.981	.986	.993	.998	1.004	1.010
26	1.016	1.022	1.028	1.034	1.040	1.046	1.052	1.058	1.064	1.070
27	1.076	1.082	1.089	1.095	1.101	1.108	1.114	1.120	1.126	1.132
28	1.139	1.145	1.152	1.158	1.165	1.172	1.178	1.184	1.191	1.198
29	1.204	1.211	1.218							

**TABLES OF CORRECTIONS FOR DETERMINING THE TRUE CAPACITIES OF GLASS
VESSELS FROM THE WEIGHT OF WATER IN AIR—Continued**

[Amounts to be added to apparent weight of water in grams to obtain actual capacity in milliliters at 20° C

TABLE 36.—Indicated Capacity 200 ml

Temp. in Deg. C	Tenths of Degrees									
	0	1	2	3	4	5	6	7	8	9
15	0.414	0.417	0.419	0.422	0.424	0.427	0.430	0.432	0.435	0.437
16	.440	.443	.445	.448	.451	.454	.456	.459	.462	.465
17	.468	.470	.473	.477	.479	.482	.485	.488	.491	.494
18	.497	.501	.504	.507	.510	.513	.516	.519	.523	.526
19	.529	.533	.536	.540	.543	.546	.550	.553	.557	.560
20	.564	.567	.571	.574	.578	.582	.585	.589	.593	.596
21	.600	.604	.608	.612	.615	.619	.623	.627	.631	.635
22	.639	.643	.647	.650	.655	.659	.663	.667	.671	.675
23	.679	.683	.688	.692	.696	.700	.705	.709	.713	.717
24	.722	.726	.731	.735	.739	.744	.748	.753	.757	.762
25	.766	.771	.775	.780	.785	.789	.794	.799	.803	.808
26	.813	.818	.822	.827	.832	.837	.842	.846	.851	.856
27	.861	.866	.871	.876	.881	.886	.891	.896	.901	.906
28	.911	.917	.922	.927	.932	.937	.942	.947	.953	.958
29	.963	.969	.974							

TABLE 37.—Indicated Capacity 150 ml

15	0.311	0.313	0.314	0.316	0.318	0.320	0.322	0.324	0.326	0.328
16	.330	.332	.334	.336	.338	.340	.342	.344	.346	.349
17	.351	.353	.355	.357	.359	.362	.364	.366	.368	.371
18	.373	.375	.378	.380	.383	.385	.387	.390	.392	.395
19	.397	.400	.402	.405	.408	.410	.412	.415	.418	.420
20	.423	.425	.428	.431	.433	.436	.439	.442	.445	.448
21	.450	.453	.456	.459	.461	.464	.467	.470	.473	.476
22	.479	.483	.485	.488	.491	.494	.497	.500	.503	.506
23	.509	.512	.516	.519	.522	.525	.529	.532	.535	.538
24	.541	.545	.548	.551	.554	.558	.562	.565	.568	.571
25	.575	.578	.581	.585	.588	.592	.596	.599	.602	.606
26	.610	.613	.617	.620	.624	.628	.631	.635	.638	.642
27	.645	.649	.653	.657	.661	.664	.668	.672	.676	.680
28	.684	.688	.691	.695	.699	.703	.707	.711	.715	.719
29	.722	.726	.730							

TABLE 38.—Indicated Capacity 100 ml

15	0.207	0.208	0.210	0.211	0.212	0.213	0.215	0.216	0.217	0.219
16	.220	.221	.223	.224	.225	.227	.228	.230	.231	.232
17	.234	.235	.237	.238	.240	.241	.243	.244	.246	.247
18	.249	.250	.252	.253	.255	.257	.258	.260	.261	.263
19	.265	.266	.268	.270	.272	.273	.275	.277	.278	.280
20	.282	.284	.285	.287	.289	.291	.293	.294	.296	.298
21	.300	.302	.304	.306	.308	.310	.311	.314	.315	.317
22	.319	.321	.323	.325	.327	.329	.331	.333	.336	.338
23	.340	.342	.344	.346	.348	.350	.352	.354	.357	.359
24	.361	.363	.365	.368	.370	.372	.374	.376	.379	.381
25	.383	.386	.388	.390	.392	.395	.397	.399	.402	.404
26	.406	.409	.411	.416	.418	.421	.421	.423	.426	.428
27	.431	.433	.436	.438	.440	.443	.446	.448	.451	.453
28	.456	.458	.461	.463	.466	.469	.471	.474	.476	.479
29	.482	.484	.487							

TABLES OF CORRECTIONS FOR DETERMINING THE TRUE CAPACITIES OF GLASS VESSELS FROM THE WEIGHT OF WATER IN AIR—Continued

[Amounts to be added to apparent weight of water in grams to obtain actual capacity in milliliters at 20° C]

TABLE 39.—Indicated Capacity 90 ml

Temp. in Deg. C	Tenths of Degrees									
	0	1	2	3	4	5	6	7	8	9
15	0.186	0.188	0.189	0.190	0.191	0.192	0.193	0.194	0.196	0.197
16	.198	.199	.200	.202	.203	.204	.205	.207	.208	.209
17	.210	.212	.213	.214	.216	.217	.218	.220	.221	.222
18	.224	.225	.227	.228	.230	.231	.232	.234	.235	.237
19	.238	.240	.241	.243	.244	.246	.247	.249	.251	.252
20	.254	.255	.257	.258	.260	.262	.263	.265	.267	.268
21	.270	.272	.273	.275	.277	.278	.280	.282	.284	.286
22	.287	.289	.291	.293	.295	.296	.298	.300	.302	.304
23	.306	.308	.309	.311	.313	.315	.317	.319	.321	.323
24	.325	.327	.329	.331	.333	.335	.337	.339	.341	.343
25	.345	.347	.349	.351	.353	.355	.357	.359	.362	.364
26	.366	.368	.370	.372	.374	.377	.379	.381	.383	.385
27	.388	.390	.392	.394	.396	.399	.401	.403	.406	.408
28	.410	.412	.415	.417	.419	.422	.424	.426	.429	.431
29	.434	.436	.438							

TABLE 40.—Indicated Capacity 80 ml

15	0.166	0.167	0.168	0.169	0.170	0.171	0.172	0.173	0.174	0.175
16	.176	.177	.178	.179	.180	.181	.183	.184	.185	.186
17	.187	.188	.189	.191	.192	.193	.194	.195	.196	.198
18	.199	.200	.201	.203	.204	.205	.206	.208	.209	.210
19	.212	.213	.214	.216	.217	.218	.220	.221	.223	.224
20	.226	.227	.228	.230	.231	.233	.234	.236	.237	.239
21	.240	.241	.243	.245	.246	.248	.249	.251	.252	.254
22	.255	.257	.259	.260	.262	.264	.265	.267	.268	.270
23	.272	.273	.275	.277	.278	.280	.282	.284	.285	.287
24	.289	.290	.292	.294	.296	.298	.299	.301	.303	.305
25	.306	.308	.310	.312	.314	.316	.318	.320	.321	.323
26	.325	.327	.329	.331	.333	.335	.337	.339	.341	.342
27	.344	.346	.348	.350	.352	.354	.356	.358	.360	.362
28	.365	.367	.369	.371	.373	.375	.377	.379	.381	.383
29	.385	.387	.390							

TABLE 41.—Indicated Capacity 70 ml

15	0.145	0.146	0.147	0.148	0.148	0.149	0.150	0.151	0.152	0.153
16	.154	.155	.156	.157	.158	.159	.160	.161	.162	.163
17	.164	.165	.166	.167	.168	.169	.170	.171	.172	.173
18	.174	.175	.176	.177	.178	.180	.181	.182	.183	.184
19	.185	.186	.188	.189	.190	.191	.192	.194	.195	.196
20	.197	.199	.200	.201	.202	.204	.205	.206	.207	.209
21	.210	.211	.213	.214	.216	.217	.218	.220	.221	.222
22	.224	.225	.226	.228	.229	.230	.232	.233	.235	.236
23	.238	.239	.241	.242	.244	.245	.247	.248	.250	.251
24	.253	.254	.256	.257	.259	.260	.262	.263	.265	.267
25	.268	.270	.271	.273	.274	.276	.278	.280	.281	.283
26	.284	.286	.288	.289	.291	.293	.294	.296	.298	.299
27	.301	.303	.305	.307	.308	.310	.312	.314	.315	.317
28	.319	.321	.323	.324	.326	.328	.330	.332	.333	.335
29	.337	.339	.341							

TABLES OF CORRECTIONS FOR DETERMINING THE TRUE CAPACITIES OF GLASS VESSELS FROM THE WEIGHT OF WATER IN AIR—Continued

[Amounts to be added to apparent weight of water in grams to obtain actual capacity in milliliters at 20° C]

TABLE 42.—Indicated Capacity 60 ml

Temp. in Deg. C	Tenths of Degrees									
	0	1	2	3	4	5	6	7	8	9
15	.0124	.0125	.0126	.0127	.0127	.0128	.0129	.0130	.0130	.0131
16	.132	.133	.134	.134	.135	.136	.137	.138	.139	.140
17	.140	.141	.142	.143	.144	.145	.145	.147	.147	.148
18	.150	.150	.151	.152	.153	.154	.155	.156	.157	.158
19	.159	.160	.161	.162	.163	.164	.165	.166	.167	.168
20	.169	.170	.171	.172	.173	.175	.176	.177	.178	.179
21	.180	.181	.182	.183	.185	.186	.187	.188	.189	.190
22	.192	.193	.194	.195	.196	.198	.199	.200	.201	.202
23	.204	.205	.206	.208	.209	.210	.211	.213	.214	.215
24	.216	.218	.219	.220	.222	.223	.225	.226	.227	.228
25	.230	.231	.232	.234	.235	.237	.238	.240	.241	.242
26	.244	.245	.247	.248	.250	.251	.253	.254	.255	.257
27	.258	.260	.261	.263	.264	.266	.267	.269	.270	.272
28	.273	.275	.276	.278	.280	.281	.283	.284	.286	.288
29	.289	.291	.292							

TABLE 43.—Indicated Capacity 50 ml

15	.0104	.0104	.0105	.0106	.0106	.0107	.0107	.0108	.0109	.0109
16	.110	.111	.111	.112	.113	.113	.114	.115	.116	.116
17	.117	.118	.118	.119	.120	.121	.121	.122	.123	.124
18	.124	.125	.126	.127	.128	.128	.129	.130	.131	.132
19	.132	.133	.134	.135	.136	.137	.137	.138	.139	.140
20	.141	.142	.143	.144	.144	.145	.146	.147	.148	.149
21	.150	.151	.152	.153	.154	.155	.156	.157	.158	.159
22	.160	.161	.162	.163	.164	.165	.166	.167	.168	.169
23	.170	.171	.172	.173	.174	.175	.176	.177	.178	.179
24	.180	.182	.183	.184	.185	.186	.187	.188	.189	.190
25	.192	.193	.194	.195	.196	.197	.199	.200	.201	.202
26	.203	.204	.206	.207	.208	.209	.210	.212	.213	.214
27	.215	.216	.218	.219	.220	.222	.223	.224	.225	.226
28	.228	.229	.230	.232	.233	.234	.236	.237	.238	.240
29	.241	.242	.244							

TABLE 44.—Indicated Capacity 45 ml

15	.0093	.0094	.0094	.0095	.0095	.0096	.0097	.0097	.0098	.0098
16	.099	.100	.100	.101	.101	.102	.103	.103	.104	.105
17	.105	.106	.107	.107	.108	.108	.109	.110	.111	.111
18	.112	.113	.113	.114	.115	.115	.116	.117	.118	.118
19	.119	.120	.121	.121	.122	.123	.124	.124	.125	.126
20	.127	.128	.128	.129	.130	.131	.132	.132	.133	.134
21	.135	.136	.137	.138	.138	.139	.140	.141	.142	.143
22	.144	.145	.145	.146	.147	.148	.149	.150	.151	.152
23	.153	.154	.155	.156	.157	.158	.159	.160	.160	.161
24	.162	.163	.164	.165	.166	.167	.168	.169	.170	.171
25	.172	.173	.174	.176	.177	.178	.179	.180	.181	.182
26	.183	.184	.185	.186	.187	.188	.189	.190	.192	.193
27	.194	.195	.196	.197	.198	.199	.201	.202	.203	.204
28	.205	.206	.207	.209	.210	.211	.212	.213	.214	.216
29	.217	.218	.219							

TABLES OF CORRECTIONS FOR DETERMINING THE TRUE CAPACITIES OF GLASS VESSELS FROM THE WEIGHT OF WATER IN AIR—Continued

[Amounts to be added to apparent weight of water in grams to obtain actual capacity in milliliters at 20° C]

TABLE 45.—Indicated Capacity 40 ml

Temp. in Deg. C	Tenths of Degrees									
	0	1	2	3	4	5	6	7	8	9
15	0.083	0.083	0.084	0.084	0.085	0.085	0.086	0.086	0.087	0.087
16	.088	.089	.089	.090	.090	.091	.091	.092	.092	.093
17	.094	.094	.095	.095	.096	.096	.097	.098	.098	.099
18	.099	.100	.101	.101	.102	.102	.103	.104	.105	.105
19	.106	.107	.107	.108	.109	.109	.110	.111	.111	.112
20	.113	.113	.114	.115	.116	.116	.117	.118	.119	.119
21	.120	.121	.122	.122	.123	.124	.125	.125	.126	.127
22	.128	.129	.129	.130	.131	.132	.133	.133	.134	.135
23	.136	.137	.138	.138	.139	.140	.141	.142	.143	.143
24	.144	.145	.146	.147	.148	.149	.150	.151	.151	.152
25	.153	.154	.155	.156	.157	.158	.159	.160	.161	.162
26	.163	.164	.164	.165	.166	.167	.168	.169	.170	.171
27	.172	.173	.174	.175	.176	.177	.178	.179	.180	.181
28	.182	.183	.184	.185	.186	.187	.188	.189	.191	.192
29	.193	.194	.195							

TABLE 46.—Indicated Capacity 35 ml

15	0.073	0.073	0.073	0.074	0.074	0.075	0.075	0.076	0.076	0.076
16	.077	.078	.078	.078	.079	.079	.080	.080	.081	.081
17	.082	.082	.083	.083	.084	.084	.085	.085	.086	.086
18	.087	.088	.088	.089	.089	.090	.090	.091	.091	.092
19	.092	.093	.094	.094	.095	.096	.096	.097	.097	.098
20	.099	.099	.100	.100	.101	.102	.102	.103	.104	.104
21	.105	.106	.106	.107	.108	.108	.109	.110	.110	.111
22	.112	.113	.113	.114	.115	.115	.116	.117	.117	.118
23	.119	.120	.120	.121	.122	.122	.123	.124	.125	.126
24	.126	.127	.128	.129	.129	.130	.131	.132	.133	.133
25	.134	.135	.136	.137	.137	.138	.139	.140	.141	.141
26	.142	.143	.144	.145	.146	.146	.147	.148	.149	.150
27	.151	.152	.152	.153	.154	.155	.156	.157	.158	.159
28	.159	.160	.161	.162	.163	.164	.165	.166	.167	.168
29	.169	.170	.170							

TABLE 47.—Indicated Capacity 30 ml

15	0.062	0.063	0.063	0.063	0.064	0.064	0.064	0.065	0.065	0.066
16	.066	.066	.067	.067	.068	.068	.068	.069	.069	.070
17	.070	.071	.071	.071	.072	.072	.073	.073	.074	.074
18	.075	.075	.076	.076	.077	.077	.077	.078	.078	.079
19	.079	.080	.080	.081	.081	.082	.082	.083	.084	.084
20	.085	.085	.086	.086	.087	.087	.088	.088	.089	.089
21	.090	.091	.091	.092	.092	.093	.093	.094	.094	.095
22	.096	.096	.097	.098	.098	.099	.099	.100	.101	.101
23	.102	.103	.103	.104	.104	.105	.106	.106	.107	.108
24	.108	.109	.110	.110	.111	.112	.112	.113	.114	.114
25	.115	.116	.116	.117	.118	.118	.119	.120	.121	.121
26	.122	.123	.123	.124	.125	.126	.126	.127	.128	.128
27	.129	.130	.131	.131	.132	.133	.134	.134	.135	.136
28	.137	.137	.138	.139	.140	.141	.141	.142	.143	.144
29	.145	.145	.146							

MASTER SCALES FOR THE GRADUATION OF HYDROMETERS

The accompanying tables were prepared for the use of hydrometer makers in the graduation of hydrometer scales to indicate percentages of ethyl alcohol by weight at 20° C or by volume at 60° F, and they give the proportional length of any part of the hydrometer scale, assuming that the entire scale has a length of 1000 mm⁹ and that the hydrometer stem is of uniform cross section. For example, if it is required to construct a hydrometer scale having a certain range the spacing of the graduations of the scale should be made proportional to the differences of the lengths shown in the table for that range.

These tables were prepared from the alcoholometric tables published in this circular, (Tables 2 and 3). The original work on which the tables are based is described in detail in the Bulletin of the Bureau of Standards, Vol. 9, p. 328 (Reprint No. 197). The indications of hydrometers graduated in accordance with these master scales will be on the basis officially adopted by the Bureau of Standards. Hydrometers may also be graduated to indicate percentages of "proof spirit," according to the official tables of the United States Bureau of Internal Revenue (adopted 1913), by the use of the accompanying master scale intended for the graduation of hydrometers to indicate percentages of alcohol by volume at 60° F. The percentage of proof spirit is in every case twice the percentage of alcohol by volume. For example, 25 per cent alcohol by volume is equivalent to 50 per cent proof spirit; 50 per cent alcohol by volume is equivalent to 100 per cent proof spirit. The spacing of the graduations for proof spirit hydrometers can therefore be taken directly from Table 49, the per cent alcohol by volume being multiplied by 2 in each case to give the equivalent per cent proof spirit.

⁹Any other convenient unit may be employed; the tabulated lengths will then be in that unit.

TABLE 48.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C

[Total length of scale 1000 mm]

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
0.0	0.00	5.0	33.78	10.0	62.96	15.0	89.50	20.0	115.45
.1	0.71	.1	34.40	.1	63.51	.1	90.00	.1	115.99
.2	1.42	.2	35.02	.2	64.06	.2	90.50	.2	116.53
.3	2.13	.3	35.64	.3	64.61	.3	91.00	.3	117.07
.4	2.84	.4	36.26	.4	65.16	.4	91.50	.4	117.61
.5	3.55	.5	36.87	.5	65.71	.5	91.99	.5	118.15
.6	4.26	.6	37.48	.6	66.26	.6	92.48	.6	118.69
.7	4.97	.7	38.08	.7	66.81	.7	92.98	.7	119.23
.8	5.68	.8	38.68	.8	67.36	.8	93.48	.8	119.78
.9	6.38	.9	39.28	.9	67.91	.9	93.98	.9	120.33
1.0	7.08	6.0	39.88	11.0	68.45	16.0	94.49	21.0	120.88
.1	7.78	.1	40.48	.1	68.99	.1	95.00	.1	121.43
.2	8.48	.2	41.08	.2	69.53	.2	95.51	.2	121.98
.3	9.18	.3	41.68	.3	70.07	.3	96.02	.3	122.53
.4	9.88	.4	42.28	.4	70.61	.4	96.53	.4	123.08
.5	10.58	.5	42.88	.5	71.15	.5	97.04	.5	123.63
.6	11.28	.6	43.47	.6	71.69	.6	97.55	.6	124.18
.7	11.97	.7	44.06	.7	72.23	.7	98.06	.7	124.73
.8	12.66	.8	44.65	.8	72.77	.8	98.57	.8	125.28
.9	13.35	.9	45.24	.9	73.31	.9	99.08	.9	125.83
2.0	14.04	7.0	45.82	12.0	73.84	17.0	99.60	22.0	126.38
.1	14.73	.1	46.40	.1	74.37	.1	100.12	.1	126.94
.2	15.42	.2	46.98	.2	74.90	.2	100.64	.2	127.50
.3	16.11	.3	47.56	.3	75.43	.3	101.16	.3	128.06
.4	16.80	.4	48.14	.4	75.96	.4	101.68	.4	128.62
.5	17.49	.5	48.72	.5	76.49	.5	102.20	.5	129.19
.6	18.18	.6	49.30	.6	77.02	.6	102.72	.6	129.76
.7	18.87	.7	49.88	.7	77.55	.7	103.24	.7	130.32
.8	19.55	.8	50.46	.8	78.08	.8	103.76	.8	130.90
.9	20.22	.9	51.04	.9	78.61	.9	104.28	.9	131.47
3.0	20.89	8.0	51.62	13.0	79.13	18.0	104.80	23.0	132.04
.1	21.56	.1	52.19	.1	79.65	.1	105.32	.1	132.61
.2	22.22	.2	52.76	.2	80.17	.2	105.85	.2	133.18
.3	22.88	.3	53.33	.3	80.69	.3	106.38	.3	133.75
.4	23.54	.4	53.90	.4	81.21	.4	106.91	.4	134.32
.5	24.20	.5	54.47	.5	81.73	.5	107.44	.5	134.89
.6	24.85	.6	55.04	.6	82.25	.6	107.97	.6	135.46
.7	25.50	.7	55.61	.7	82.77	.7	108.50	.7	136.03
.8	26.15	.8	56.18	.8	83.29	.8	109.03	.8	136.60
.9	26.80	.9	56.75	.9	83.81	.9	109.56	.9	137.18
4.0	27.45	9.0	57.32	14.0	84.33	19.0	110.09	24.0	137.76
.1	28.09	.1	57.89	.1	84.85	.1	110.62	.1	138.34
.2	28.73	.2	58.46	.2	85.37	.2	111.15	.2	138.92
.3	29.37	.3	59.03	.3	85.89	.3	111.68	.3	139.50
.4	30.01	.4	59.60	.4	86.41	.4	112.21	.4	140.09
.5	30.64	.5	60.17	.5	86.93	.5	112.75	.5	140.68
.6	31.27	.6	60.73	.6	87.45	.6	113.29	.6	141.27
.7	31.90	.7	61.29	.7	87.97	.7	113.83	.7	141.86
.8	32.53	.8	61.85	.8	88.49	.8	114.37	.8	142.45
.9	33.16	.9	62.41	.9	89.00	.9	114.91	.9	143.04
5.0	33.78	10.0	62.96	15.0	89.50	20.0	115.45	25.0	143.63

TABLE 48.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
25.0	143.63	30.0	175.93	35.0	213.09	40.0	254.74	45.0	300.41
.1	144.22	.1	176.63	.1	213.88	.1	255.62	.1	301.85
.2	144.82	.2	177.33	.2	214.67	.2	256.50	.2	302.29
.3	145.42	.3	178.03	.3	215.46	.3	257.38	.3	303.23
.4	146.02	.4	178.73	.4	216.26	.4	258.26	.4	304.17
.5	146.62	.5	179.43	.5	217.06	.5	259.14	.5	305.12
.6	147.23	.6	180.13	.6	217.86	.6	260.02	.6	306.07
.7	147.84	.7	180.84	.7	218.66	.7	260.90	.7	307.02
.8	148.45	.8	181.55	.8	219.46	.8	261.79	.8	307.97
.9	149.06	.9	182.26	.9	220.26	.9	262.68	.9	308.92
26.0	149.67	31.0	182.97	36.0	221.06	41.0	263.57	46.0	309.88
.1	150.28	.1	183.68	.1	221.86	.1	264.46	.1	310.84
.2	150.90	.2	184.40	.2	222.67	.2	265.35	.2	311.80
.3	151.52	.3	185.12	.3	223.48	.3	266.24	.3	312.76
.4	152.14	.4	185.85	.4	224.29	.4	267.14	.4	313.72
.5	152.77	.5	186.58	.5	225.10	.5	268.04	.5	314.68
.6	153.40	.6	187.31	.6	225.91	.6	268.94	.6	315.64
.7	154.03	.7	188.04	.7	226.73	.7	269.84	.7	316.60
.8	154.66	.8	188.77	.8	227.55	.8	270.74	.8	317.56
.9	155.29	.9	189.51	.9	228.37	.9	271.64	.9	318.52
27.0	155.93	32.0	190.25	37.0	229.19	42.0	272.55	47.0	319.49
.1	156.57	.1	190.99	.1	230.01	.1	273.46	.1	320.46
.2	157.21	.2	191.73	.2	230.84	.2	274.37	.2	321.43
.3	157.85	.3	192.47	.3	231.67	.3	275.28	.3	322.40
.4	158.49	.4	193.21	.4	232.50	.4	276.19	.4	323.37
.5	159.14	.5	193.95	.5	233.34	.5	277.11	.5	324.34
.6	159.79	.6	194.69	.6	234.18	.6	278.03	.6	325.31
.7	160.44	.7	195.44	.7	235.02	.7	278.95	.7	326.28
.8	161.09	.8	196.19	.8	235.86	.8	279.87	.8	327.25
.9	161.74	.9	196.94	.9	236.70	.9	280.79	.9	328.22
28.0	162.40	33.0	197.69	38.0	237.54	43.0	281.71	48.0	329.19
.1	163.06	.1	198.45	.1	238.38	.1	282.63	.1	330.16
.2	163.72	.2	199.21	.2	239.23	.2	283.55	.2	331.14
.3	164.38	.3	199.97	.3	240.08	.3	284.48	.3	332.12
.4	165.04	.4	200.73	.4	240.93	.4	285.41	.4	333.10
.5	165.70	.5	201.49	.5	241.78	.5	286.34	.5	334.09
.6	166.37	.6	202.25	.6	242.63	.6	287.27	.6	335.08
.7	167.04	.7	203.01	.7	243.49	.7	288.20	.7	336.07
.8	167.71	.8	203.77	.8	244.35	.8	289.13	.8	337.06
.9	168.38	.9	204.53	.9	245.21	.9	290.07	.9	338.05
29.0	169.06	34.0	205.30	39.0	246.07	44.0	291.01	49.0	339.04
.1	169.74	.1	206.07	.1	246.93	.1	291.95	.1	340.03
.2	170.42	.2	206.84	.2	247.79	.2	292.89	.2	341.02
.3	171.10	.3	207.61	.3	248.65	.3	293.83	.3	342.01
.4	171.78	.4	208.38	.4	249.51	.4	294.77	.4	343.00
.5	172.47	.5	209.16	.5	250.38	.5	295.71	.5	343.99
.6	173.16	.6	209.94	.6	251.25	.6	296.65	.6	344.98
.7	173.85	.7	210.72	.7	252.12	.7	297.59	.7	345.97
.8	174.54	.8	211.51	.8	252.99	.8	298.53	.8	346.96
.9	175.23	.9	212.30	.9	253.86	.9	299.47	.9	347.96
30.0	175.93	35.0	213.09	40.0	254.74	45.0	300.41	50.0	348.96

TABLE 48.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
50.0	348.96	55.0	400.41	60.0	454.11	65.0	510.19	70.0	568.65
.1	349.96	.1	401.46	.1	455.21	.1	511.34	.1	569.85
.2	350.96	.2	402.52	.2	456.31	.2	512.49	.2	571.05
.3	351.96	.3	403.58	.3	457.41	.3	513.64	.3	572.25
.4	352.96	.4	404.64	.4	458.51	.4	514.79	.4	573.45
.5	353.97	.5	405.70	.5	459.61	.5	515.94	.5	574.65
.6	354.98	.6	406.76	.6	460.71	.6	517.09	.6	575.85
.7	355.99	.7	407.82	.7	461.82	.7	518.24	.7	577.05
.8	357.01	.8	408.88	.8	462.93	.8	519.39	.8	578.25
.9	358.03	.9	409.94	.9	464.04	.9	520.54	.9	579.46
51.0	359.05	56.0	411.00	61.0	465.15	66.0	521.70	71.0	580.67
.1	360.07	.1	412.06	.1	466.26	.1	522.86	.1	581.88
.2	361.09	.2	413.12	.2	467.37	.2	524.02	.2	583.09
.3	362.11	.3	414.18	.3	468.48	.3	525.18	.3	584.30
.4	363.13	.4	415.24	.4	469.59	.4	526.34	.4	585.51
.5	364.15	.5	416.31	.5	470.70	.5	527.50	.5	586.72
.6	365.17	.6	417.38	.6	471.81	.6	528.66	.6	587.93
.7	366.19	.7	418.45	.7	472.92	.7	529.82	.7	589.14
.8	367.22	.8	419.52	.8	474.03	.8	530.98	.8	590.35
.9	368.25	.9	420.59	.8	475.14	.9	532.14	.9	591.56
52.0	369.28	57.0	421.66	62.0	476.25	67.0	533.30	72.0	592.77
.1	370.31	.1	422.73	.1	477.37	.1	534.46	.1	593.99
.2	371.34	.2	423.80	.2	478.49	.2	535.62	.2	595.21
.3	372.37	.3	424.87	.3	479.61	.3	536.79	.3	596.43
.4	373.40	.4	425.94	.4	480.73	.4	537.96	.4	597.65
.5	374.43	.5	427.01	.5	481.85	.5	539.13	.5	598.87
.6	375.46	.6	428.08	.6	482.97	.6	540.30	.6	600.09
.7	376.49	.7	429.15	.7	484.09	.7	541.47	.7	601.31
.8	377.52	.8	430.22	.8	485.21	.8	542.64	.8	602.53
.9	378.55	.9	431.29	.9	486.33	.9	543.81	.9	603.75
53.0	379.58	58.0	432.37	63.0	487.46	68.0	544.98	73.0	604.98
.1	380.61	.1	433.45	.1	488.59	.1	546.15	.1	606.21
.2	381.64	.2	434.53	.2	489.72	.2	547.32	.2	607.44
.3	382.67	.3	435.61	.3	490.85	.3	548.49	.3	608.67
.4	383.70	.4	436.69	.4	491.98	.4	549.66	.4	609.90
.5	384.73	.5	437.77	.5	493.11	.5	550.84	.5	611.13
.6	385.76	.6	438.85	.6	494.24	.6	552.02	.6	612.36
.7	386.80	.7	439.93	.7	495.37	.7	553.20	.7	613.59
.8	387.84	.8	441.02	.8	496.50	.8	554.38	.8	614.82
.9	388.88	.9	442.11	.9	497.64	.9	555.56	.9	616.05
54.0	389.92	59.0	443.20	64.0	498.78	59.0	556.74	74.0	617.29
.1	390.96	.1	444.29	.1	499.92	.1	557.92	.1	618.53
.2	392.01	.2	445.38	.2	501.06	.2	559.10	.2	619.77
.3	393.06	.3	446.47	.3	502.20	.3	560.29	.3	621.01
.4	394.11	.4	447.56	.4	503.34	.4	561.48	.4	622.25
.5	395.16	.5	448.65	.5	504.48	.5	562.67	.5	623.49
.6	396.21	.6	449.74	.6	505.62	.6	563.86	.6	624.73
.7	397.26	.7	450.83	.7	506.76	.7	565.05	.7	625.98
.8	398.31	.8	451.92	.8	507.90	.8	566.25	.8	627.23
.9	399.36	.9	453.01	.9	509.04	.9	567.45	.9	628.48
55.0	400.41	60.0	454.11	65.0	510.19	70.0	568.65	75.0	629.73

TABLE 48.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Weight at 20° C.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
75.0	629.73	80.0	693.50	85.0	760.69	90.0	832.76	95.0	911.46
.1	630.98	.1	694.81	.1	762.08	.1	834.26	.1	913.12
.2	632.23	.2	696.12	.2	763.47	.2	835.76	.2	914.78
.3	633.48	.3	697.43	.3	764.86	.3	837.27	.3	916.44
.4	634.73	.4	698.74	.4	766.25	.4	838.78	.4	918.11
.5	635.98	.5	700.06	.5	767.65	.5	840.29	.5	919.79
.6	637.23	.6	701.38	.6	769.05	.6	841.80	.6	921.47
.7	638.48	.7	702.70	.7	770.45	.7	843.32	.7	923.16
.8	639.73	.8	704.02	.8	771.85	.8	844.84	.8	924.85
.9	640.98	.9	705.34	.9	773.25	.9	846.37	.9	926.54
76.0	642.23	81.0	706.66	86.0	774.66	91.0	847.90	96.0	928.24
.1	643.48	.1	707.98	.1	776.07	.1	849.43	.1	929.94
.2	644.73	.2	709.30	.2	777.48	.2	850.96	.2	931.64
.3	645.99	.3	710.62	.3	778.89	.3	852.50	.3	933.35
.4	647.25	.4	711.95	.4	780.30	.4	854.04	.4	935.06
.5	648.51	.5	713.28	.5	781.72	.5	855.58	.5	936.78
.6	649.77	.6	714.61	.6	783.14	.6	857.12	.6	938.50
.7	651.03	.7	715.94	.7	784.56	.7	858.67	.7	940.22
.8	652.29	.8	717.27	.8	785.98	.8	860.22	.8	941.95
.9	653.55	.9	718.60	.9	787.40	.9	861.77	.9	943.68
77.0	654.81	82.0	719.94	87.0	788.83	92.0	863.33	97.0	945.42
.1	656.08	.1	721.28	.1	790.26	.1	864.89	.1	947.17
.2	657.35	.2	722.62	.2	791.70	.2	866.46	.2	948.92
.3	658.62	.3	723.96	.3	793.14	.3	868.03	.3	950.68
.4	659.90	.4	725.30	.4	794.58	.4	869.61	.4	952.44
.5	661.18	.5	726.64	.5	796.02	.5	871.19	.5	954.21
.6	662.46	.6	727.98	.6	797.46	.6	872.77	.6	955.98
.7	663.74	.7	729.32	.7	798.91	.7	874.35	.7	957.76
.8	665.02	.8	730.66	.8	800.36	.8	875.93	.8	959.55
.9	666.30	.9	732.00	.9	801.81	.9	877.52	.9	961.34
78.0	667.58	83.0	733.35	88.0	803.26	93.0	879.11	98.0	963.14
.1	668.86	.1	734.70	.1	804.71	.1	880.70	.1	964.94
.2	670.14	.2	736.05	.2	806.16	.2	882.29	.2	966.75
.3	671.43	.3	737.40	.3	807.61	.3	883.88	.3	968.56
.4	672.72	.4	738.76	.4	809.07	.4	885.48	.4	970.38
.5	674.01	.5	740.12	.5	810.53	.5	887.08	.5	972.20
.6	675.30	.6	741.48	.6	811.99	.6	888.68	.6	974.02
.7	676.59	.7	742.84	.7	813.45	.7	890.29	.7	975.85
.8	677.88	.8	744.20	.8	814.92	.8	891.90	.8	977.58
.9	679.17	.9	745.56	.9	816.39	.9	893.51	.9	979.51
79.0	680.47	84.0	746.92	89.0	817.86	94.0	895.12	99.0	981.35
.1	681.77	.1	748.29	.1	819.34	.1	896.74	.1	983.19
.2	683.07	.2	749.66	.2	820.82	.2	898.36	.2	985.03
.3	684.37	.3	751.03	.3	822.30	.3	899.98	.3	986.88
.4	685.67	.4	752.40	.4	823.79	.4	901.61	.4	988.74
.5	686.97	.5	753.78	.5	825.28	.5	903.24	.5	990.60
.6	688.27	.6	755.16	.6	826.77	.6	904.88	.6	992.47
.7	689.57	.7	756.54	.7	828.26	.7	906.52	.7	994.35
.8	690.88	.8	757.92	.8	829.76	.8	908.16	.8	996.23
.9	692.19	.9	759.30	.9	831.26	.9	909.81	.9	998.11
80.0	693.50	85.0	760.69	90.0	832.76	95.0	911.46	100.0	1 000.00

TABLE 49.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F

[Total length of scale 1000 mm]

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
0.0	0.00	5.0	27.84	10.0	52.30	15.0	74.47	20.0	94.90
.1	0.58	.1	28.37	.1	52.76	.1	74.89	.1	95.30
.2	1.16	.2	28.90	.2	53.22	.2	75.31	.2	95.70
.3	1.73	.3	29.43	.3	53.68	.3	75.73	.3	96.10
.4	2.31	.4	29.96	.4	54.14	.4	76.15	.4	96.50
.5	2.89	.5	30.48	.5	54.60	.5	76.57	.5	96.90
.6	3.47	.6	31.00	.6	55.06	.6	76.99	.6	97.30
.7	4.04	.7	31.51	.7	55.52	.7	77.41	.7	97.70
.8	4.62	.8	32.02	.8	55.98	.8	77.83	.8	98.11
.9	5.20	.9	32.53	.9	56.44	.9	78.25	.9	98.51
1.0	5.78	6.0	33.04	11.0	56.90	16.0	78.67	21.0	98.92
.1	6.36	.1	33.55	.1	57.36	.1	79.09	.1	99.33
.2	6.93	.2	34.05	.2	57.82	.2	79.51	.2	99.74
.3	7.50	.3	34.55	.3	58.28	.3	79.93	.3	100.15
.4	8.07	.4	35.05	.4	58.74	.4	80.35	.4	100.56
.5	8.64	.5	35.55	.5	59.20	.5	80.77	.5	100.97
.6	9.21	.6	36.05	.6	59.65	.6	81.19	.6	101.38
.7	9.78	.7	36.55	.7	60.10	.7	81.60	.7	101.79
.8	10.35	.8	37.05	.8	60.55	.8	82.01	.8	102.20
.9	10.92	.9	37.55	.9	61.00	.9	82.42	.9	102.61
2.0	11.49	7.0	38.05	12.0	61.45	17.0	82.83	22.0	103.02
.1	12.05	.1	38.54	.1	61.90	.1	83.24	.1	103.43
.2	12.61	.2	39.03	.2	62.35	.2	83.65	.2	103.84
.3	13.17	.3	39.52	.3	62.79	.3	84.06	.3	104.25
.4	13.73	.4	40.01	.4	63.23	.4	84.47	.4	104.66
.5	14.29	.5	40.50	.5	63.67	.5	84.88	.5	105.08
.6	14.85	.6	40.98	.6	64.11	.6	85.28	.6	105.50
.7	15.41	.7	41.46	.7	64.55	.7	85.69	.7	105.92
.8	15.97	.8	41.94	.8	64.99	.8	86.09	.8	106.34
.9	16.52	.9	42.42	.9	65.43	.9	86.49	.9	106.76
3.0	17.07	8.0	42.89	13.0	65.87	18.0	86.89	23.0	107.18
.1	17.62	.1	43.36	.1	66.31	.1	87.29	.1	107.60
.2	18.17	.2	43.83	.2	66.74	.2	87.69	.2	108.02
.3	18.72	.3	44.30	.3	67.17	.3	88.09	.3	108.44
.4	19.27	.4	44.77	.4	67.60	.4	88.50	.4	108.86
.5	19.82	.5	45.24	.5	68.03	.5	88.90	.5	109.28
.6	20.37	.6	45.72	.6	68.46	.6	89.30	.6	109.70
.7	20.91	.7	46.20	.7	68.89	.7	89.70	.7	110.12
.8	21.45	.8	46.67	.8	69.32	.8	90.10	.8	110.54
.9	21.99	.9	47.14	.9	69.75	.9	90.50	.9	110.96
4.0	22.53	9.0	47.61	14.0	70.18	19.0	90.90	24.0	111.38
.1	23.07	.1	48.08	.1	70.61	.1	91.30	.1	111.81
.2	23.60	.2	48.55	.2	71.04	.2	91.70	.2	112.24
.3	24.13	.3	49.02	.3	71.47	.3	92.10	.3	112.67
.4	24.66	.4	49.49	.4	71.90	.4	92.50	.4	113.10
.5	25.19	.5	49.96	.5	72.33	.5	92.90	.5	113.53
.6	25.72	.6	50.43	.6	72.76	.6	93.30	.6	113.96
.7	26.25	.7	50.90	.7	73.19	.7	93.70	.7	114.39
.8	26.78	.8	51.37	.8	73.62	.8	94.10	.8	114.82
.9	27.31	.9	51.84	.9	74.05	.9	94.50	.9	115.25
5.0	27.84	10.0	52.30	15.0	74.47	20.0	94.90	25.0	115.68

TABLE 49.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
25.0	115.68	30.0	138.27	35.0	164.35	40.0	195.12	45.0	230.59
.1	116.11	.1	138.75	.1	164.92	.1	195.79	.1	231.35
.2	116.54	.2	139.23	.2	165.49	.2	196.46	.2	232.11
.3	116.97	.3	139.71	.3	166.06	.3	197.13	.3	232.87
.4	117.40	.4	140.20	.4	166.63	.4	197.80	.4	233.63
.5	117.83	.5	140.69	.5	167.20	.5	198.47	.5	234.39
.6	118.27	.6	141.18	.6	167.78	.6	199.14	.6	235.16
.7	118.71	.7	141.67	.7	168.36	.7	199.82	.7	235.93
.8	119.15	.8	142.16	.8	168.94	.8	200.50	.8	236.71
.9	119.59	.9	142.65	.9	169.53	.9	201.18	.9	237.49
26.0	120.03	31.0	143.14	36.0	170.12	41.0	201.86	46.0	238.28
.1	120.47	.1	143.63	.1	170.71	.1	202.55	.1	239.06
.2	120.91	.2	144.12	.2	171.30	.2	203.24	.2	239.84
.3	121.35	.3	144.61	.3	171.89	.3	203.93	.3	240.62
.4	121.79	.4	145.10	.4	172.48	.4	204.62	.4	241.40
.5	122.23	.5	145.59	.5	173.08	.5	205.31	.5	242.18
.6	122.67	.6	146.09	.6	173.68	.6	206.00	.6	242.97
.7	123.12	.7	146.59	.7	174.28	.7	206.70	.7	243.76
.8	123.57	.8	147.11	.8	174.88	.8	207.40	.8	244.55
.9	124.02	.9	147.63	.9	175.48	.9	208.10	.9	245.34
27.0	124.47	32.0	148.15	37.0	176.08	42.0	208.80	47.0	246.14
.1	124.92	.1	148.67	.1	176.69	.1	209.50	.1	246.94
.2	125.37	.2	149.19	.2	177.30	.2	210.20	.2	247.74
.3	125.82	.3	149.71	.3	177.91	.3	210.90	.3	248.54
.4	126.27	.4	150.23	.4	178.52	.4	211.60	.4	249.35
.5	126.72	.5	150.75	.5	179.13	.5	212.31	.5	250.16
.6	127.17	.6	151.27	.6	179.75	.6	213.02	.6	250.97
.7	127.62	.7	151.79	.7	180.37	.7	213.73	.7	251.79
.8	128.07	.8	152.31	.8	180.99	.8	214.44	.8	252.61
.9	128.52	.9	152.84	.9	181.62	.9	215.15	.9	253.43
28.0	128.98	33.0	153.37	38.0	182.25	43.0	215.87	48.0	254.25
.1	129.44	.1	153.90	.1	182.88	.1	216.59	.1	255.07
.2	129.90	.2	154.43	.2	183.51	.2	217.31	.2	255.89
.3	130.36	.3	154.96	.3	184.14	.3	218.03	.3	256.71
.4	130.82	.4	155.50	.4	184.77	.4	218.75	.4	257.53
.5	131.28	.5	156.04	.5	185.40	.5	219.48	.5	258.36
.6	131.74	.6	156.58	.6	186.03	.6	220.21	.6	259.19
.7	132.20	.7	157.12	.7	186.67	.7	220.94	.7	260.02
.8	132.66	.8	157.66	.8	187.31	.8	221.67	.8	260.85
.9	133.12	.9	158.21	.9	187.95	.9	222.40	.9	261.69
29.0	133.58	34.0	158.76	39.0	188.59	44.0	223.14	49.0	262.53
.1	134.04	.1	159.31	.1	189.23	.1	223.88	.1	263.37
.2	134.51	.2	159.86	.2	189.88	.2	224.62	.2	264.21
.3	134.98	.3	160.42	.3	190.53	.3	225.36	.3	265.05
.4	135.45	.4	160.98	.4	191.18	.4	226.10	.4	265.89
.5	135.92	.5	161.54	.5	191.83	.5	226.84	.5	266.74
.6	136.39	.6	162.10	.6	192.48	.6	227.59	.6	267.59
.7	136.86	.7	162.66	.7	193.13	.7	228.34	.7	268.44
.8	137.33	.8	163.22	.8	193.79	.8	229.09	.8	269.30
.9	137.80	.9	163.78	.9	194.45	.9	229.84	.9	270.16
30.0	138.27	35.0	164.35	40.0	195.12	45.0	230.59	50.0	271.02

TABLE 49.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
50.0	271.02	55.0	315.94	60.0	365.01	65.0	418.40	70.0	476.10
.1	271.88	.1	316.88	.1	366.04	.1	419.50	.1	477.31
.2	272.74	.2	317.82	.2	367.07	.2	420.60	.2	478.52
.3	273.60	.3	318.76	.3	368.10	.3	421.71	.3	479.73
.4	274.47	.4	319.70	.4	369.13	.4	422.82	.4	480.94
.5	275.34	.5	320.65	.5	370.16	.5	423.93	.5	482.15
.6	276.21	.6	321.60	.6	371.20	.6	425.05	.6	483.36
.7	277.08	.7	322.55	.7	372.24	.7	426.17	.7	484.57
.8	277.95	.8	323.50	.8	373.28	.8	427.29	.8	485.78
.9	278.82	.9	324.45	.9	374.32	.9	428.41	.9	487.00
51.0	279.70	56.0	325.40	61.0	375.36	66.0	429.54	71.0	488.22
.1	280.58	.1	326.35	.1	376.40	.1	430.67	.1	489.45
.2	281.46	.2	327.31	.2	377.44	.2	431.80	.2	490.68
.3	282.34	.3	328.27	.3	378.49	.3	432.93	.3	491.91
.4	283.22	.4	329.23	.4	379.54	.4	434.06	.4	493.14
.5	284.10	.5	330.19	.5	380.60	.5	435.19	.5	494.37
.6	284.98	.6	331.15	.6	381.66	.6	436.32	.6	495.60
.7	285.87	.7	332.11	.7	382.72	.7	437.45	.7	496.84
.8	286.76	.8	333.07	.8	383.78	.8	438.60	.8	498.08
.9	287.65	.9	334.03	.9	384.84	.9	439.75	.9	499.32
52.0	288.54	57.0	334.99	62.0	385.91	67.0	440.90	72.0	500.56
.1	289.43	.1	335.95	.1	386.98	.1	442.05	.1	501.80
.2	290.32	.2	336.92	.2	388.05	.2	443.20	.2	503.05
.3	291.21	.3	337.89	.3	389.12	.3	444.35	.3	504.30
.4	292.10	.4	338.87	.4	390.19	.4	445.50	.4	505.56
.5	292.99	.5	339.85	.5	391.26	.5	446.65	.5	506.82
.6	293.89	.6	340.83	.6	392.33	.6	447.80	.6	508.08
.7	294.79	.7	341.81	.7	393.40	.7	448.95	.7	509.34
.8	295.69	.8	342.79	.8	394.47	.8	450.11	.8	510.60
.9	296.59	.9	343.78	.9	395.55	.9	451.26	.9	511.86
53.0	297.50	58.0	344.78	63.0	396.63	68.0	452.42	73.0	513.13
.1	298.41	.1	345.78	.1	397.71	.1	453.58	.1	514.40
.2	299.32	.2	346.78	.2	398.79	.2	454.74	.2	515.67
.3	300.23	.3	347.78	.3	399.87	.3	455.91	.3	516.94
.4	301.14	.4	348.78	.4	400.95	.4	457.08	.4	518.21
.5	302.05	.5	349.78	.5	402.03	.5	458.25	.5	519.48
.6	302.96	.6	350.78	.6	403.11	.6	459.43	.6	520.76
.7	303.87	.7	351.78	.7	404.19	.7	460.61	.7	522.04
.8	304.78	.8	352.78	.8	405.27	.8	461.79	.8	523.32
.9	305.70	.9	353.79	.9	406.36	.9	462.98	.9	524.60
54.0	306.62	59.0	354.80	64.0	407.45	69.0	464.17	74.0	525.89
.1	307.55	.1	355.81	.1	408.54	.1	465.36	.1	527.18
.2	308.48	.2	356.82	.2	409.63	.2	466.55	.2	528.47
.3	309.41	.3	357.84	.3	410.72	.3	467.74	.3	529.76
.4	310.34	.4	358.86	.4	411.81	.4	468.93	.4	531.05
.5	311.27	.5	359.88	.5	412.90	.5	470.12	.5	532.34
.6	312.20	.6	360.90	.6	414.00	.6	471.31	.6	533.63
.7	313.13	.7	361.92	.7	415.10	.7	472.50	.7	534.92
.8	314.06	.8	362.95	.8	416.20	.8	473.70	.8	536.21
.9	315.00	.9	363.98	.9	417.30	.9	474.90	.9	537.51
55.0	315.94	60.0	365.01	65.0	418.40	70.0	476.10	75.0	538.81

TABLE 49.—Master Scale for the Graduation of Hydrometers to Indicate Percentages of Ethyl Alcohol by Volume at 60° F.—Continued

Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length	Per cent alcohol	Length
	mm		mm		mm		mm		mm
75.0	538.81	80.0	607.33	85.0	682.71	90.0	767.67	95.0	868.34
.1	540.12	.1	608.77	.1	684.31	.1	769.50	.1	870.60
.2	541.43	.2	610.21	.2	685.91	.2	771.33	.2	872.87
.3	542.74	.3	611.65	.3	687.52	.3	773.16	.3	875.15
.4	544.05	.4	613.09	.4	689.13	.4	774.99	.4	877.44
.5	545.37	.5	614.53	.5	690.74	.5	776.83	.5	879.74
.6	546.69	.6	615.97	.6	692.36	.6	778.68	.6	882.05
.7	548.01	.7	617.42	.7	693.98	.7	780.54	.7	884.37
.8	549.33	.8	618.87	.8	695.60	.8	782.41	.8	886.71
.9	550.66	.9	620.33	.9	697.23	.9	784.29	.9	889.06
76.0	552.00	81.0	621.79	86.0	698.86	91.0	786.18	96.0	891.43
.1	553.34	.1	623.26	.1	700.50	.1	788.08	.1	893.82
.2	554.68	.2	624.73	.2	702.14	.2	789.98	.2	896.22
.3	556.02	.3	626.20	.3	703.79	.3	791.88	.3	898.62
.4	557.36	.4	627.67	.4	705.44	.4	793.78	.4	901.03
.5	558.70	.5	629.14	.5	707.10	.5	795.69	.5	903.45
.6	560.05	.6	630.62	.6	708.76	.6	797.62	.6	905.89
.7	561.40	.7	632.10	.7	710.42	.7	799.57	.7	908.34
.8	562.75	.8	633.58	.8	712.08	.8	801.52	.8	910.80
.9	564.10	.9	635.07	.9	713.74	.9	803.49	.9	913.27
77.0	565.45	82.0	636.56	87.0	715.41	92.0	805.46	97.0	915.75
.1	566.81	.1	638.05	.1	717.08	.1	807.44	.1	918.25
.2	568.17	.2	639.54	.2	718.75	.2	809.42	.2	920.77
.3	569.53	.3	641.03	.3	720.43	.3	811.40	.3	923.31
.4	570.89	.4	642.53	.4	722.11	.4	813.39	.4	925.88
.5	572.25	.5	644.03	.5	723.80	.5	815.38	.5	928.46
.6	573.62	.6	645.54	.6	725.50	.6	817.38	.6	931.05
.7	574.99	.7	647.05	.7	727.20	.7	819.40	.7	933.66
.8	576.37	.8	648.57	.8	728.90	.8	821.42	.8	936.28
.9	577.75	.9	650.09	.9	730.60	.9	823.45	.9	938.93
78.0	579.13	83.0	651.61	88.0	732.31	93.0	825.49	98.0	941.61
.1	580.52	.1	653.13	.1	734.02	.1	827.54	.1	944.33
.2	581.92	.2	654.65	.2	735.74	.2	829.60	.2	947.06
.3	583.32	.3	656.18	.3	737.46	.3	831.67	.3	949.80
.4	584.72	.4	657.71	.4	739.19	.4	833.74	.4	952.56
.5	586.12	.5	659.24	.5	740.93	.5	835.82	.5	955.35
.6	587.52	.6	660.77	.6	742.68	.6	837.90	.6	958.16
.7	588.92	.7	662.31	.7	744.43	.7	840.00	.7	961.00
.8	590.32	.8	663.85	.8	746.19	.8	842.12	.8	963.86
.9	591.72	.9	665.40	.9	747.95	.9	844.25	.9	966.74
79.0	593.12	84.0	666.96	89.0	749.72	94.0	846.40	99.0	969.64
.1	594.53	.1	668.52	.1	751.49	.1	848.56	.1	972.56
.2	595.94	.2	670.08	.2	753.27	.2	850.73	.2	975.52
.3	597.35	.3	671.64	.3	755.05	.3	852.90	.3	978.50
.4	598.77	.4	673.21	.4	756.84	.4	855.08	.4	981.50
.5	600.19	.5	674.79	.5	758.64	.5	857.26	.5	984.52
.6	601.61	.6	676.37	.6	760.45	.6	859.46	.6	987.55
.7	603.04	.7	677.95	.7	762.25	.7	861.67	.7	990.61
.8	604.47	.8	679.53	.8	764.05	.8	863.88	.8	993.71
.9	605.90	.9	681.12	.9	765.86	.9	866.10	.9	996.84
80.0	607.33	85.0	682.71	90.0	767.67	95.0	868.34	100.0	1 000.00

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